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POPULAR MECHANICS MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

REG U.S. PAT. OFF.

JUN 13 1918

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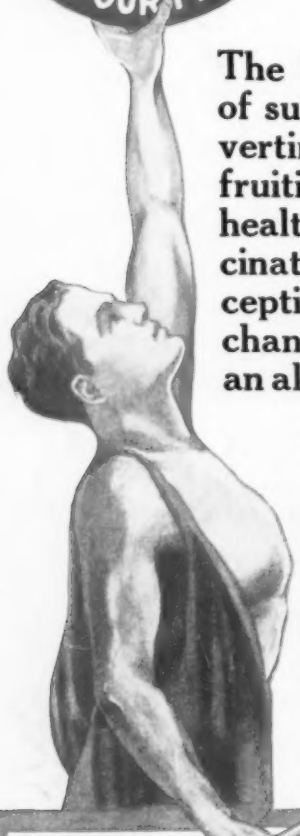

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Popular Mechanics Magazine

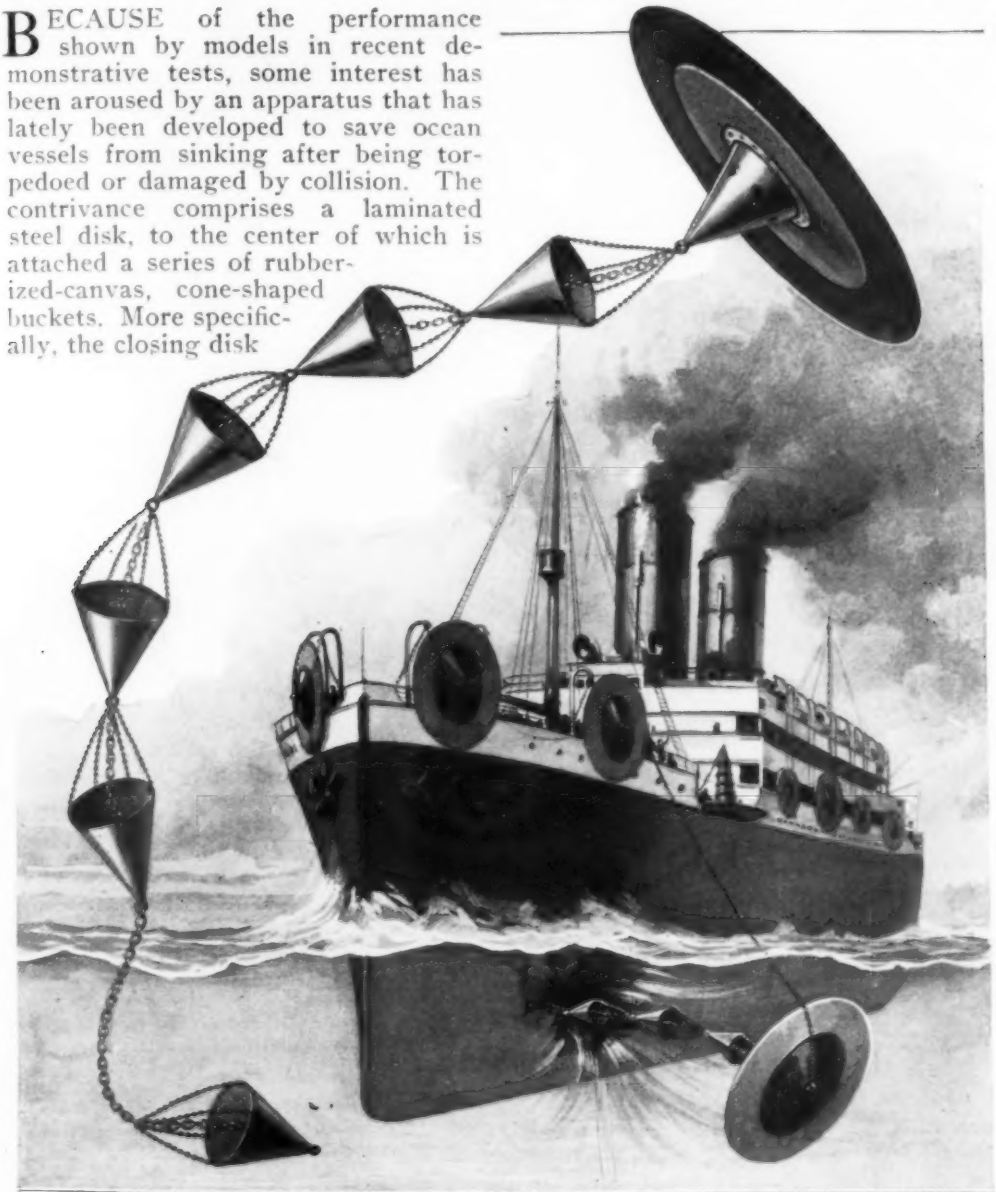
REGISTERED IN U. S. PATENT OFFICE

WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 30 JULY, 1918 No. 1

Plug Hole in Ship's Hull with Disk Stopper

BECAUSE of the performance shown by models in recent demonstrative tests, some interest has been aroused by an apparatus that has lately been developed to save ocean vessels from sinking after being torpedoed or damaged by collision. The contrivance comprises a laminated steel disk, to the center of which is attached a series of rubberized-canvas, cone-shaped buckets. More specifically, the closing disk

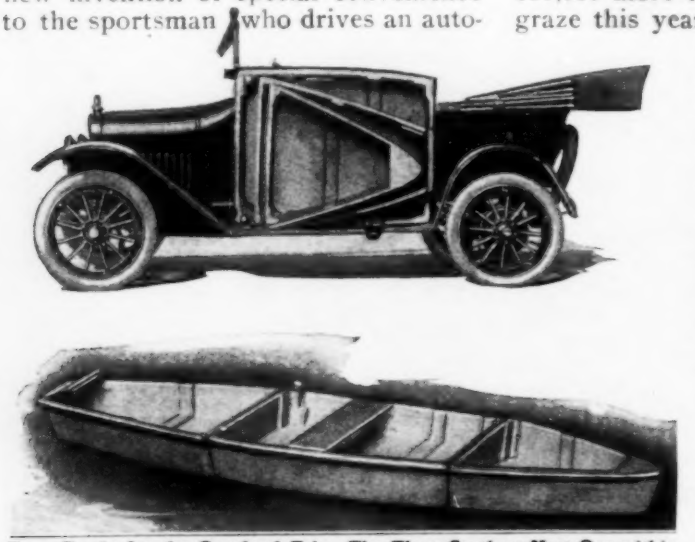


Showing General Details of the Construction of the Big Steel Stopper and Its Cone-Shaped Guiding Buckets, as Well as Indicating the Method of Using the Device to Prevent the Sinking of a Torpedoed Ship

is built up of circular plates so as to have great strength in the middle and flexibility at its outer extremities. It is faced with a thick layer of compressible material that, when subjected to pressure, will fill and cover, watertightly, the uneven surfaces surrounding the hole in the hull. The other side of the disk is overlaid with a rubberized fabric that is circular in shape and of greater diameter than the base member. The stopper could be provided in various sizes up to 30 or 40 ft. in diameter. In use, the end cone on the chain would be lowered into the water in the vicinity of the hole in a ship's hull. Upon being caught by the inrushing water, it would be pulled through the opening. The whole string of buckets would then be lowered along with the disk so that the latter would be pulled in place over the break. The cones, being of flexible material, would be able to pass through an aperture, regardless of its shape. The disk, once in place, would be held by the pressure of the water against the hull. Thus patched, a ship could stay afloat indefinitely and in many cases make port unaided.

SECTIONAL BOAT CARRIED ON AUTO RUNNING BOARD

A sectional flat-bottom rowboat is a new invention of special convenience to the sportsman who drives an automobile. The craft is divided into three sections, each with bulkhead ends, which can be nested one within the other and carried on the running board of an automobile. It requires only a few minutes to assemble the parts and fasten them together by means of clamps and bolts. The craft is built of light durable materials and, being of shallow draft, is well suited to duck hunting and the like.



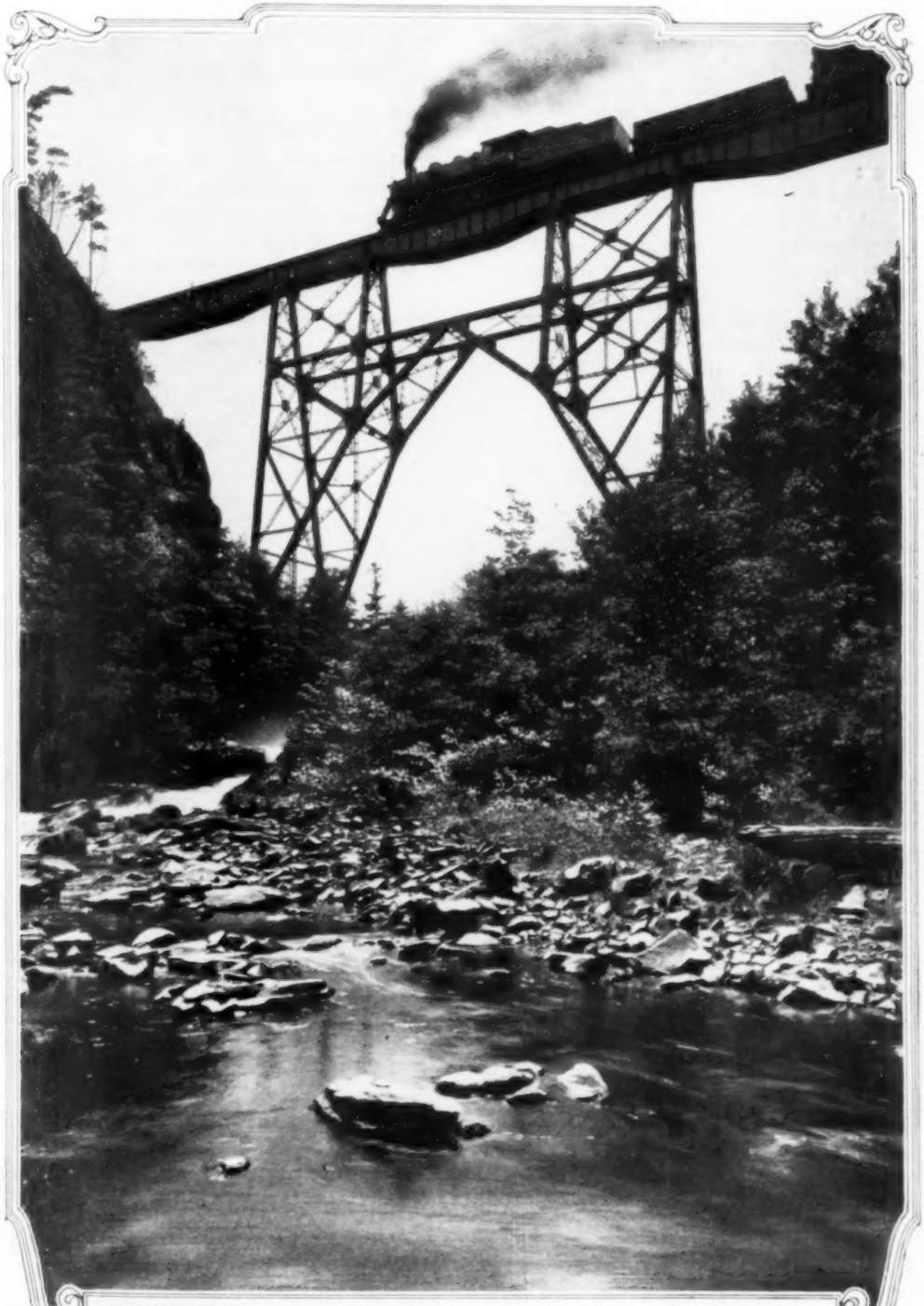
Top: Ready for the Overland Trip. The Three Sections Nest One within the Other, Making a Fairly Compact Load. Bottom: The Boat Assembled for Use. Clamps and Bolts Hold the Three Parts Together Securely

MORE LIVE STOCK TO GRAZE IN NATIONAL FORESTS

Half a million more sheep and nearly 250,000 more cattle will be allowed to graze this year on the national forest ranges than were permitted last year, because of the war-time need of beef, mutton, wool, hides, etc. This will bring the total number of stock grazed under permit to about 9,000,000 sheep, 2,360,000 cattle, and 51,000 swine. The productivity of the ranges has been steadily increased in the last decade and, but for the war, the secretary of agriculture doubtless would not have felt justified in taking some chance of overgrazing for the sake of immediate production. However, the increases this year have been made with great care. The largest are in Colorado, Wyoming, and California forests.

¶The War Department has announced that camouflage camps, or classes for training women in camouflage work, are not authorized by it. Work of this character is not fitted for women, it is pointed out.

HIGH VIADUCT IS OF UNUSUAL CONSTRUCTION



DISTINCTIVE features are embodied in a new plate-girder viaduct crossing the Dead River near Marquette, Mich., and pictured herewith. The top chord of the polygonal arch does not form the bridge deck. Instead, two bents on either side of the trusses carry a pair of tower spans between which there is a girder span. The arch has a span of 116 ft. The distance from water level to rails is 135 feet.

"SUDDENLY—!"

By LEWIS

(If there is one word which recurs oftener than has befallen him,

NAVAL life in the North Sea would be comic in the swiftness of its transitions—if it were not also so tragic. Perhaps, indeed, it is the somber background which they stand out against that make the flashes of comedy seem all the more comic, like an incident in connection with the torpedoing of a cruiser I was told of a few days ago.

"It was not so long after Christmas," said the one of the half dozen surviving officers who told me the story, "and there were a few of the festal decorations stuck up here and there, mostly wreaths of holly and mistletoe sent from home. Eight or ten of us were sitting in the ward room after dinner, having a bit of a 'sing-song' to the music of the staff surgeon's mandolin and the engineer commander's guitar. The mouldie hit us full and fair amidships, and exploded with a thud that made itself felt in the ward room with a sort of convulsive jerk.

"Everything loose flew off on a tangent, among them being a curtain pole and a wreath of holly. The curtain went into a heap on the deck, but the wreath—by the freakiest of coincidences—made a fair ringer of the P. M. O.'s curly pate. He was a chap with a hair-trigger sense of humor, and a nose for scenting the ridiculous that was almost sublime. Clapping the prickly garland down on his brow at an even more rakish angle than it had landed at, he threw down his mandolin, draped the fallen curtain over his shoulders like a Roman toga, and seized the poker of the empty tile stove. Recovering, with a quick grab, the mandolin from beneath the divan where it had rolled, he tucked it under his chin like a violin, and began sawing violently across its protesting strings with the poker as a bow. Swaying undulantly from the waist like a virtuoso, he began shouting at the top of his voice, 'Nero fiddling while Rome is burning! Christians

" 'Swaying undulantly from the waist like a virtuoso, he began shouting at the top Thumbs down! Thumbs down!' We were hard hit, and the most of us there was a man of us that wasn't

take cover! Thumbs down! Thumbs down!' We were hard hit, and the most of us realized it was only a matter of minutes before she went down; but I don't think there was a man of us that wasn't laughing as he made for the door. I could laugh yet at the mere thinking of it if it wasn't for the fact that—that the P. M. O. was not in any of the boats that were picked up by the destroyers a couple of hours later. The last I remember of him was seeing him brush off the holly wreath—saying something about how the 'blinkin' crown,' scratched—

—WAR SEA TALES

R. FREEMAN

another in the present-day sailor's tale of what it is "Suddenly!")

and make after us for the door, the 'toga' slipping down about his heels and the mandolin and poker grasped in either hand. He headed for'rard—we always thought to look after a chap with a twisted knee he had been

of his voice, "Nero fiddling while Rome is burning! Christians take cover! realized it was only a matter of minutes before she went down; but I don't think laughing as he made for the door.'"

treating in the sick bay—and no one ever recalled seeing him on the upper deck. The mouldie shored us right open, and it wasn't ten minutes between the time poor ——— was playing Nero and when for him and for a couple of hundred others it was 'thumbs down!' in dead earnest."

Then there was the story the cockney lad on the after searchlight platform told me one night when the ship was wallowing in a mid-winter gale somewhere off the coast of Norway. The darkness was inky, Stygian, giving a queer suggestion of "palpability" that almost impelled one to lift his hand and try to push it aside like a curtain that had brushed his face. Ahead and astern the other battleships of the division were blotted to blankness in the night, but abeam to starboard, a tremulous dusky grayness in the enshrouding opacity indicated where a screening destroyer, laboring in the lockstep of the mighty seas, was wrestling like a game but weary terrier with the "bone" in its teeth. The very consciousness of that eyeball-searing shaft of searchlight, on tap at the turn of a lever, seemed to make the blackness all the blacker.

Sheltering from the wind in the lee of the searchlight, my companion showed me how—by closing the eyes for several seconds and then opening them suddenly, with the hollowed hands shading them like looking through binoculars—the ever-so-faint glow that sometimes hovered above the destroyer's funnels could be fixed.

"That there woggly shiver," he said, leaning close and indicating with outstretched hand the fluttering halo dancing on the dark curtain of the night, "is when they'se feedin' 'er more oil, an' the light 'as a streak o' smoke to play agin. An' that blinkin' shadow jumpin' up like 'gainst the light ev'ry li'l' while—d'yu twig wot that ritely is? No? That's the top o' a big sea loomin' up higher'n 'er funnels. W'en yu 'gins to see that semi-'clipse like, tyke it frum me it's jolly well time they eased 'er down. If they keeps drivin' 'er at much more'n half speed into 'ead seas—seas like them wot's gittin' up now—ten to one somethin's goin' to carry way, and even money somethin' wurse may pay fer it."

"Like what, for instance?" I queried, taking up the slack in the hood of my "lammy" coat and buttoning down a yawning sleeve that was scooping an uncomfortable amount of brine-laden wind.

"Like wot 'appen'd to the blinkin' ol' '———' w'en I wus a stokin' 'board 'er," he replied, beginning to follow my lead in the matter of snuggling down against the weather.

"Yu see the 'ide o' that 'and, sir," he went on, and then stopped short with a chuckle as it dawned on him that he was talking in the dark. "Tyke me word fer it, any'ow," he resumed, "that it's skolded all ov'r like a lobster; an' so's me mug an' most o' the rest o' me 'ide long o' bringin' the ol' '———' roun' an' drivin' 'er inter a 'ead sea 'thout reducin' 'er speed s'ficient. It was a nasty nite off the Ushant—not so bad wot this is, but fair to middlin' dirty fer a d'stroyer bein' pushed.

"We wus far from cushy ev'n corkscrewin' long wi' the wind an' seas on our quart'r, fer she wus doin' a doubl' back-ackshun shuffl' fit to shake yer teeth loose. She wus yawin' like a hook'd porpus; but still she wus we'therin' it, which wus more'n she wus up to w'en they 'gan puttin' 'er inter it.

"Jest wot they did it fer I nev'r ritely knowed, but sud'nly the 'elm was shov'd 'ard ov'r, an' roun' she spun, rite roun' 'thout slackin' a rev'lushun o' the enguns wot wus drivin' 'er at more'n twenty knots. She waller'd fair to 'orribl' on the turn, then st'd'ed, picked up 'er speed an' duv inter the furst big sea like she wus a ferrit nippin' inter a 'ole arter a rabbit.

"It must'a bin like divin' thru' a long green tunn'l fer them wot wus 'bove decks; only mos' o' 'em nev'r cum out at t'other end. The bridge, boats, forrard gun, torpedo toobs, two o' the funnels—all went inter the drink. The one funnel wot held wus knocked almost flat on the deck. One minnit she was a middlin' modern 'stroyer tearin' 'long in the nite; the next she wus a 'elpless 'ulk rollin' drunk in the trof o' the sea, 'thout steem, steerin' gear, boats, an' harmaments, an' only 'arf 'er orficers.

"I tells you this, sir, like as I'd seed it all. Fack is, I've nev'r clapp'd eye on the ol' '———' — not on all or any part o' 'er—frum jest afore that big sea bashed ov'r 'er to this day. I fergot to tell you, sir, that she wus one o' the ol' coal burners. I wus balancin' wi' a shovel o' coal I had jest scooped up an' watchin' my chances fer to chuck it inter the furnis, w'en I felt 'er 'gin to rise like w'en she clim'ed a 'eavy sea. Then there wus a 'orrible smash, an' she stops clim'in' an' starts to shudder all ov'r like a fri'ten'd pup. Then there was a bangin' on the deck an' the roar o' water comin' down, an rite arter that a sort o' hissin' sploshun. I wus alre'dy staggerin' and keelin' sideways, an' it wus that an' the rush o' steam that slammed me 'gainst the sta'bo'rd bunkers. Goin' down in a heap in a knee-deep wash o' coal an' hot water, an' the rush o' sizzlin' steem —them wus the las' things wot I 'ave rekerlekshun uv. I got me site back two weeks arter in a horspital ashore, but me kumplexshun 'll nev'r be the syme ag'in.

"Wot 'appened wus this, sir. Not sat'sfied wi' pourin' down the funnels, or w'ere the funnels 'ad bin, the water tried a short-cut thru the ventilayters. That wot kum down the funnels blew up inter steem long as there wus any fires left, an arter that it wus boilin' water. Only the water kumin' down the ventilayters kep' us frum bein' cook'd alive. Two or three stokers wus drownded or banged up so they croaked, an' none o' us'll ev'r be priz'-winners at a beauty show ag'in.

"As fer 'ow the ol' '———' liv'd out the nite, I only knows wot's bin tol' me. They rigged some kinder pully 'aul steerin' gear, an' in the boiler o' the funnel wot didn't carry way they kep' coaxin' a dribblin' 'ead o' steem. They wus nev'r abl' to keep 'er 'ead to the seas fer long, tho', 'n' fer the mos' part the nite wus jest one long waller in the trof. Nothin' but the fack that she was b'ilt so as to roll to 'er beam ends 'thout capsizin' made

'er ride it out till daylite. So you see, sir, wot 'appens to 'stroyer' w'en they pushes 'em inter a 'ead sea, an' w'y they aims to easy 'em down a bit w'en lumps like"—he paused and balanced himself as the ship heeled under the impact of a rollicking comber and the ominous "g-r-r-r" of swirling water welled up from the decks—"like *that one* are gallivantin' 'roun' the Nor' Sea."

Swiftly tragic, too, was the transition in a little drama played out on a certain auxiliary cruiser patrolling the winter seas somewhere in the latitudes of Iceland. The story was told me by a young Scotch engineer lieutenant who took me down to the engine room, of the light cruiser I was having a run out on, to yarn away an hour of his middle watch. The humming purr of the spinning turbines ran like an obligato through the crisp "Glasgie" burr of his recital.

"'Goin' down in a heap in a knee-deep wash o' coal an' hot water, an' the rush o' sizzlin' steem—them wus the las' things wot I 'ave rekerlekshun wv. I got me site back two weeks arter in a horspital ashore, but me kumplexshun'll nev'r be the syme agin.'"

"Number twa engineer wa a lad frae the Clyde like mysel'," he began, leaning against the polished hand-rail and wiping his hands with a wisp of oily waste, "as bonny a lad as ye e'er sot een on. Standin' by or standin' easy, he wa' aye the same—singin' an' dancin' frae nicht tae morn. The day I'm tellin' ye o' we wa' hove-to in a turribl' storm—wind blawin', snae fallin' an' seas washin' richt o'er the hurricane decks (she wa' onct a liner, mind ye) o' her. On the morn I'm speakin' o', pokin' my nose frae a lee hatchway for a wee bit o' a blow—she wa' batten'd tight fore an' aft, an' the air 'tween decks wa' sick'nin'—I saw puir Jock come caperin' doun the deck, singin' an' dancin' for the very joy o' livin', whan, a' o' a suddint, a wallopin' roller bash'd o'er the side an' carried him awa' like a divot soomin' doun a burn in spate. A boat—Aye—two-eight-0 revolutions!"

"A boat wa' slung o'er the lee side," he resumed after translating some cabalistic order from the bridge into action, and ringing up the concomitant directions on the boiler-room telegraph. "'Twas a boat we aye had ready for boardin'. (I wa' tellin' ye, wa' na I, we wa' on patrol work?) They didna' wait for a reg'lar crew to mon the boat, for the first lads wha' cam' up on deck rush'd tae board her. I scooted aft tae cast oot the patent life preserver, wi' its calcium flare, aye hangin' there 'gainst wan a mon fa' o'er, an' wan I cam' back 'midships they wa' lowerin' the whaler wi' a fu' crew. Wasn't it a blessin' no' that I didna reach it in time to clim' aboard? The ship wa' rollin' her rails under—thirty degree if an inch—as she swung roun' an brocht the seas abeam, an' for the first time I saw ain o' her bilge keels (big steel fins runnin' long her sides to ease her rollin') com' clean oot o' the water.

"The boat t'uched the sea as the ship's port side rolled doun, but afore

they c'ud cast off the falls it was yank-it up as she rolled back. Up it cam', and up gaed the bilge keel gin it wa' tryin' tae catch it. Then soom mon gi' a shoot tae lower awa' ag'in. Fended aff frae the side wi' oars, the boat jest grazed the ooter edge o' the bilge keel wan the doun roll slappit it intae the water ag'in. They must ha' stopt fendin' as they passt the keel, an' then it wa' like as if the back sook frae the wave ha' pued the wee boat close ag'in the side. Whouf! Doun clappit the big steel wing like the snuffin' o' a candle. By then the ship had swung on roun' so that the seas cam' quart'r-ing, an' her motion 'gan change frae rollin' tae pitchin'.

"Nev'r in a' the weeks I was yet aboard her did she roll that port fin oot ag'in. It wa' just like a muckle sea serpent comin' up, gapin' wide its mou', gulpin' its prey an' gaein' doun ag'in. Some oars, water casks, an' such like, an' twa or three corpses—floatin' face doun—com' tae the surface, but (gin ye b'lieve it or nae) the auld reptile keepit maist o' her meal doun for ower a week, spewin' up a bit at a time efter she had finisht digestin' it anaith the churnin' bilge keel. Ain o' the officers even wad say that he saw —wan we wa' torpedoed doun by the Shetlan's a month or mair efter—haf a mon's body, wi' a rag o' dufflʼ coat roun' it, bobbin' up frae anaith the port bilge keel. I canna say gin that be true or nae, for I wa' hayin' my bath a' the time the mouldie done us in."

To no kind of craft do things happen more "suddenly" than to those which navigate beneath the sea. As I heard one of their officers put it recently, "There is not much variety in submarine life, but when it does come it is very 'various'." A story told me a few days ago by an engineer's mate —he had been given his commission for his part in that particular day's events—is fairly illustrative of the chain-lightning action that takes place aboard a submarine when things do begin to move.

"It was about eleven o'clock of the night following a rather strenuous day," he said. "We had strafed and brought down a Zepp that afternoon—the first, I believe, to be bagged by a submarine—and were headed for our base with seven of its crew (all we had a chance to pick up) as prisoners. We were running on the surface at full speed—not half anxious, as you may fancy, to get back with the news of our good luck—when a Hun destroyer —probably one of a number which had responded too late to the Zepp's 'S. O. S.'—suddenly loomed up on our starboard bow and opened fire with all her guns at less than a cable's length.

"I was on watch 'midships with my motors, but, so close was the destroyer that the 'bang-banging' of its guns sounded almost overhead. There were the heavy reports of what were probably 'four-point-ones,' and, filling the intervals between these, the 'rat-a-tat' of what must have been some kind of quick-firers of small caliber. Following almost instantly, the 'whanging' impact of shells on water smote my ears, and then the 'slamming' jars of a rain of projectiles striking our bows.

"You don't fight back on a submarine in a case of this kind. There is just one thing to do—*dive*—and you do it as if your life depended upon it (as it usually does, as a matter of fact). The officer of the watch set the 'rattle' going at the instant the destroyer's searchlights and guns flashed together, and then ducked below, closing the hatch after him.

"When you dive in the ordinary course of things there are a number of orders given. 'Flood all externals!' directs the turning of water into the tanks; 'Hard to dive!' sends the hydroplanes to the proper angle for a quick descent, and 'See the comps are venting!' is a caution to watch that the air is escaping freely before the inrush of the water. Likewise there are similar orders directing the shutting off of the Diesel engines (by which she runs on the surface), and switching onto the electric motors which drive her under water. The rattle gives all these orders at once, and its use also indicates that their speediest execution is a mat-

ter of life and death. In the danger zone, a man, asleep or awake, is seldom much beyond arm's reach of the one thing he has to do when he hears the 'z-rrrr' of the danger signal. From running quietly on the surface to submerging beyond danger of ramming or shell fire is hardly more than a matter of seconds if no one fails in his task, a thing which—with the type of men picked for the work—practically never happens.

"I was on watch with the Diesel engines in the after part of the ship, amusing myself (as these engines require practically no attention unless speed is to be reduced or increased) by watching the Hun prisoners—all sitting along in a row on the 'board' or platform by which you get round to oil the machinery — gouging out the contents of sardine tins with their teeth and fingers. They were as hungry as wolves, and not much better mannered.

"My hand went to the emergency levers at the sound of the firing, so that when the rattle was sprung, a fraction of a second later, I only had to throw them over to shut off my engines. At the same instant the banshee-like crescendo of the accelerating motors told that the underwater power had been thrown on, while the hiss of escaping air showed that the 'comps' were venting properly as the water flooded into the 'externals.' Then the deck pitched forward at a dizzy angle and down we plunged.

"Two or three of the Huns spoke a few words of English, and as the firing started outside one of them turned round to me with a grimace and shouted something with the word 'coming' in it, which I took to be a pæan over the arrival of their friends. They all set up a wild jabbering, and it was just beginning to dawn on me that they might be getting ready to make trouble by starting a 'counter offensive' when down goes her nose and the whole line of them topples over like a row of ninepins and piles up in an angle of the deck. Before even a one of them had gained his feet we had swooped down to the bottom and come to rest.

"They all set up a wild jabbering, and it was just beginning to dawn on me that they might be getting ready to make trouble by starting a 'counter offensive' when down goes her nose and the whole line of them topples over like a row of ninepins and piles up in an angle of the deck."

"As a dive the thing couldn't have been done better if we had been 'stunting' at our leisure, but for all that, and notwithstanding the fact that we were safe from further punishment so far as the destroyer was concerned, I was more than afraid that we had only escaped danger to meet a worse one. From the jar of the impact of the stuff that hit our bows I thought it was a hundred to one we were holed forward. In fact, I was expecting to see the bulkhead give way under the rush of water all the time we were plunging to the bottom. As soon as she was on

an even keel, the captain rushed forward to see how the thin little wall of steel (which we felt sure was all that separated us from drowning like rats in a trap) was holding. As there were no indications of its being under any great strain, we started to open it. To our great surprise, and still greater relief, it swung back easily and revealed everything quiet as usual.

"'Taint much in the way o' news, sir,' said one of them, holding out his paper with a grin; 'but ain't that a rippin' picter o' Vi'let L'ra'ne as "Emma" in "The Bing Boys"?'"

"Two men, who were seated on a spare torpedo bowed above a copy of the last 'Daily Mirror' we had received before sailing, rose in a sort of perfunctory way and stood at attention as the captain entered. Officers and men are too close together on a submarine to go in much for the 'externals' of discipline.

"'So you've not been taking any water,' said the captain, his eyes roving over the bulging but unpunctured plates.

"'Nary a drop, sir,' one of them answered.

"'But wasn't it hereabouts that we were hit?'

"One of them scratched his head for a bit, before saying that he did seem to have some recollection of a 'kind o' bangin' up 'bove.' Then he added, 'But we wus standin' by to fire our mouldie, sir, an' there want no time fer harkin' fer strange noyses.'

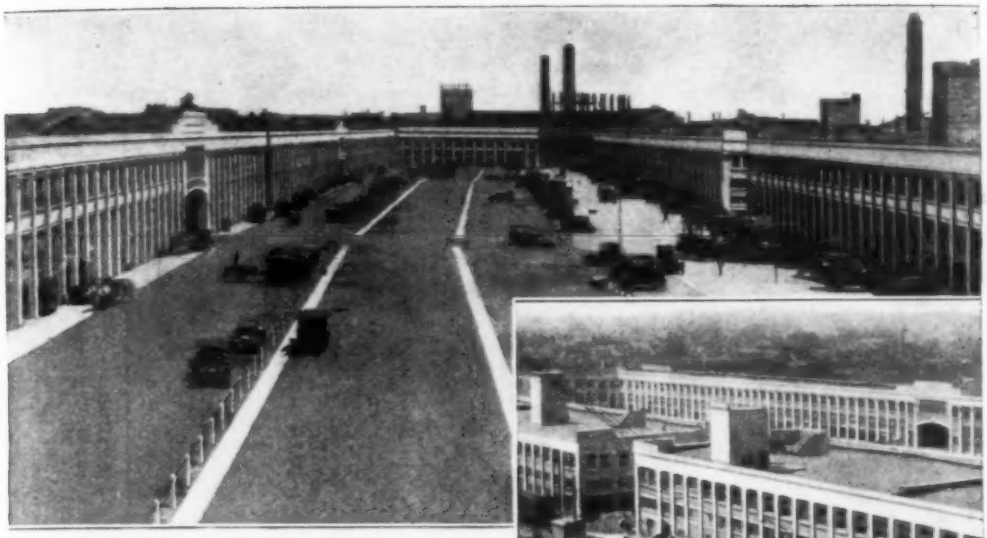
"'All right,' said the skipper with a grin. 'Carry on!' He started to go and then, turning, asked as an afterthought what was the news they were reading in the 'Daily Mirror,' that had interested them so much.

"'''Taint much in the way o' news, sir,' said one of them, holding out his paper with a grin; 'but ain't that a rippin' picter o' Vi'let L'ra'ne as 'Emma' in "The Bing Boys"?'"

These stories are all fairly typical of the way in which the British naval officer and man meet the grim and sudden emergencies which confront them in the regular routine of their day's work. If I were asked to select the two *most* typical I should unhesitatingly pick the first and the last.

LOS ANGELES NOW BOASTS BIG MODERN MARKET

The city of Los Angeles now boasts one of the most modernly equipped produce markets in the country. Facing a court 1,400 ft. long and 228 ft. wide are spacious two-story buildings uniform in height and similar in design, each equipped with the latest conveniences. Those on one side are set apart for concerns dealing chiefly in carload lots, a switch track being provided at the rear of the buildings. The long building opposite has been assigned to dealers who buy from growers, and sell to venders and retailers. The court is divided into 600



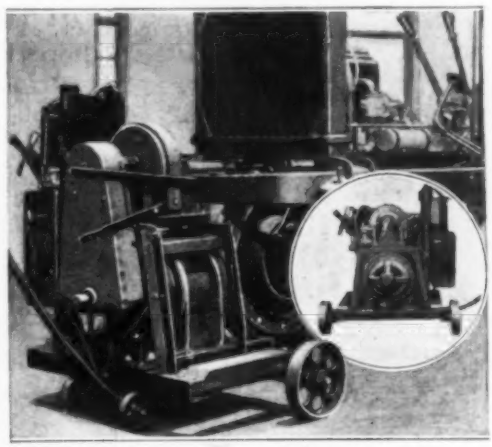
General View of Los Angeles' Splendid New Market: The Court, Which Is 1,400 Feet Long, is Divided into 600 Stalls for Produce Men

The Building in the Foreground is Occupied by Wholesale Firms Dealing Chiefly in Carload Lots. Note the Conveniently Located Switch Track

stalls for gardeners and farmers. The buildings are piped with refrigeration lines, and with steam lines that can be utilized for heating and cooking. Ample warehouses suited to various needs are also provided.

PORTABLE STARTER IS USED TO CRANK NEW MOTORS

In one of the mid-western truck factories, where some 35 big machines are being turned out daily for the army, a portable starting outfit is used to crank the new engines after the chassis have been completely assembled. The equipment consists of a 15-hp. electric motor mounted on a hand truck and fitted with a starting box, clutch, and brake. When all is ready for it, the starter is wheeled in front of a truck chassis and its shaft inserted the same as if it were an ordinary crank. The current is turned on and the truck motor turned over at a lively rate until it has "warmed up" and begun to fire regularly. A spring behind the shaft then pushes the starter out of the way. As may well be imagined, the contrivance saves much time and even more labor. A new motor with unused bearings and cold lubricants is stiff, and when cranked manually for the first time often demands the united efforts of three or four husky men.



Power Outfit Used in Assembly Department of a Truck Factory to Crank Big Motors for the First Time

FREIGHT TRAIN RUSHES ONTO SWINGING SPAN OF BRIDGE

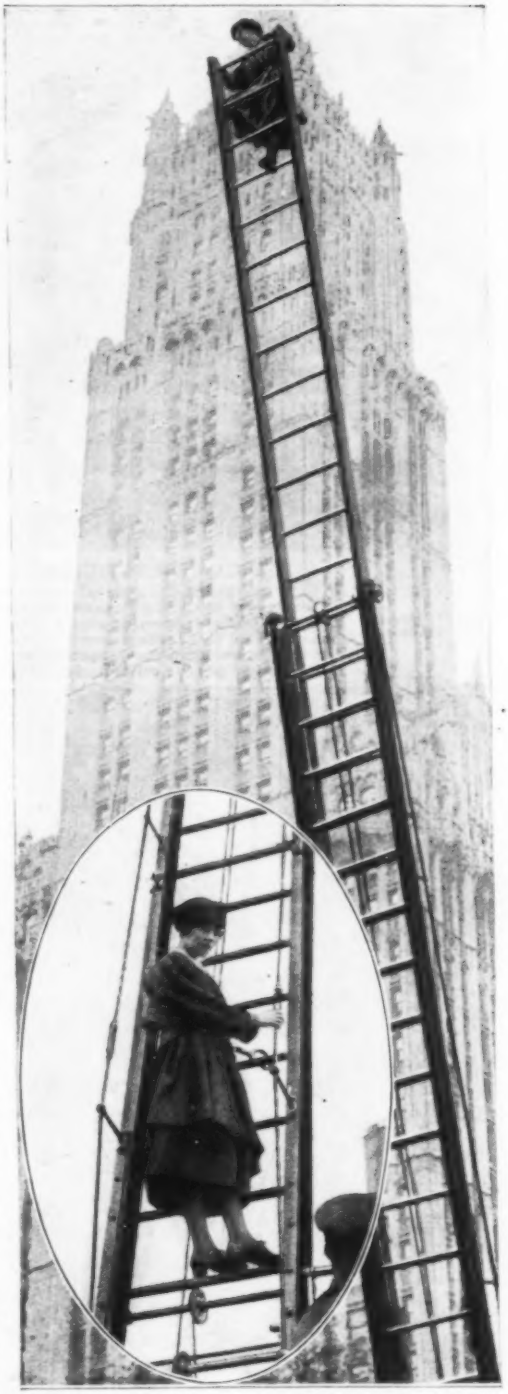
CONFUSION of signals, a swinging drawbridge, and a fast-moving freight train were the contributing elements of a spectacular wreck near Grayville, Ill., a few weeks ago. As the swing span of the bridge across the Wabash River was being opened for a launch, the freight came into view. The signal was wrongly rendered or misread. The train rushed forward onto the unlocked span—a veritable see-saw. With a crash the locomotive and three cars went down. Fortunately, no lives were lost.

RECLAIMED FARMING LANDS SHOW HIGH AVERAGE YIELD

Those who have assumed pessimistic views of the government's reclamation work will find food for thought in certain phases of a report recently made to Secretary Lane of the Department of the Interior. It is shown that crops harvested last year from 1,000,000 acres of reclaimed land had a value of $50,000,000. A gross average of $50 an acre for crops grown in the irrigated district of the "American desert" seems promising when compared with certain other figures. For instance, $16.50 was the average return per acre from all farms in 1909. Contrary to the prophecies of many, therefore, it would not seem that agriculturists on reclaimed lands are going to experience serious difficulty in paying back to the government the funds invested for them in irrigation systems. In several instances a single crop will suffice to return the entire investment. Work at present is under way on 30 different irrigation projects involving 3,112,655 acres in 15 different states. Water is now available for 1,750,000 acres.

TAFT'S NIECE SELLS BONDS BY SCALING LADDER

If a tiny youngster waves the flag, a Civil War veteran yells, "Shoot the Kaiser," or a pretty girl climbs a ladder, a street crowd will buy Liberty bonds. Anyway such sales schemes have been employed with success. Witness, for instance, the recent performance of Miss Helen Taft, a niece of the former president, who sold $7,000 worth of bonds by twice climbing a fire ladder in City Hall Plaza at New York. For each $50 bond purchased, she climbed a rung. Sixty-five steps raised her to a height of 85 ft. and brought in $3,250. She offered to jump from the top of the ladder into a life net, providing a $5,000 purchase was made. Some one bought the required block, but didn't insist upon her making the dive.



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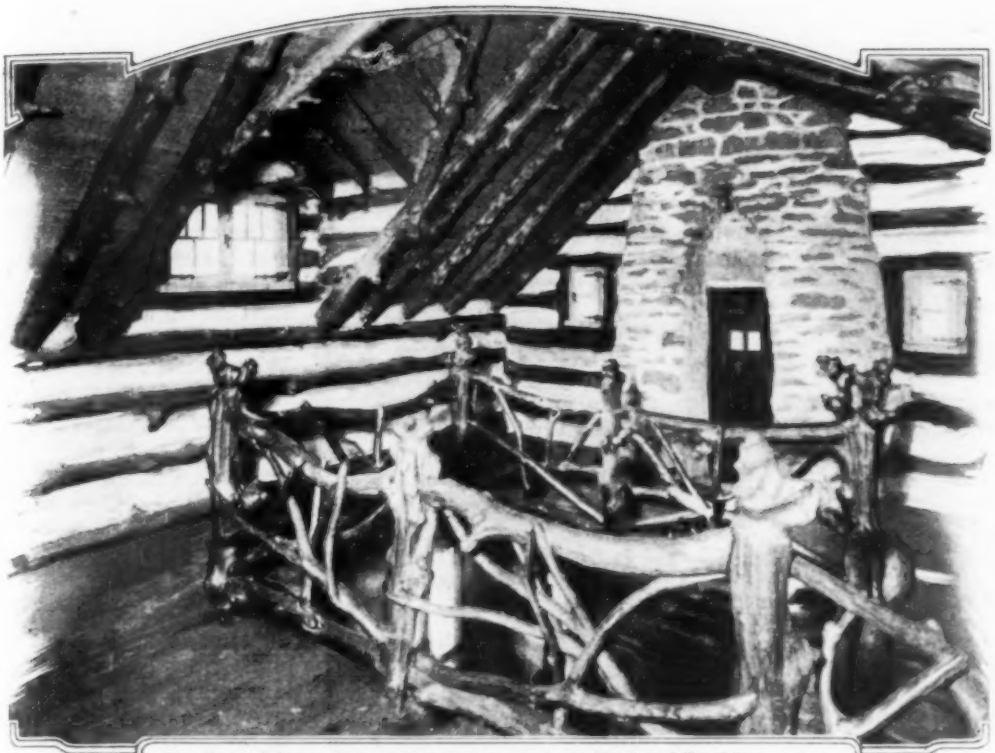
In City Hall Plaza, New York, Miss Helen Taft, Niece of the Former President, Climbing a Rung of the Ladder for Each $50 Bond Purchased on Street Below, Waiting for Some Liberty Investor to Buy a Bond. A Belt Eliminated the Danger of a Fall

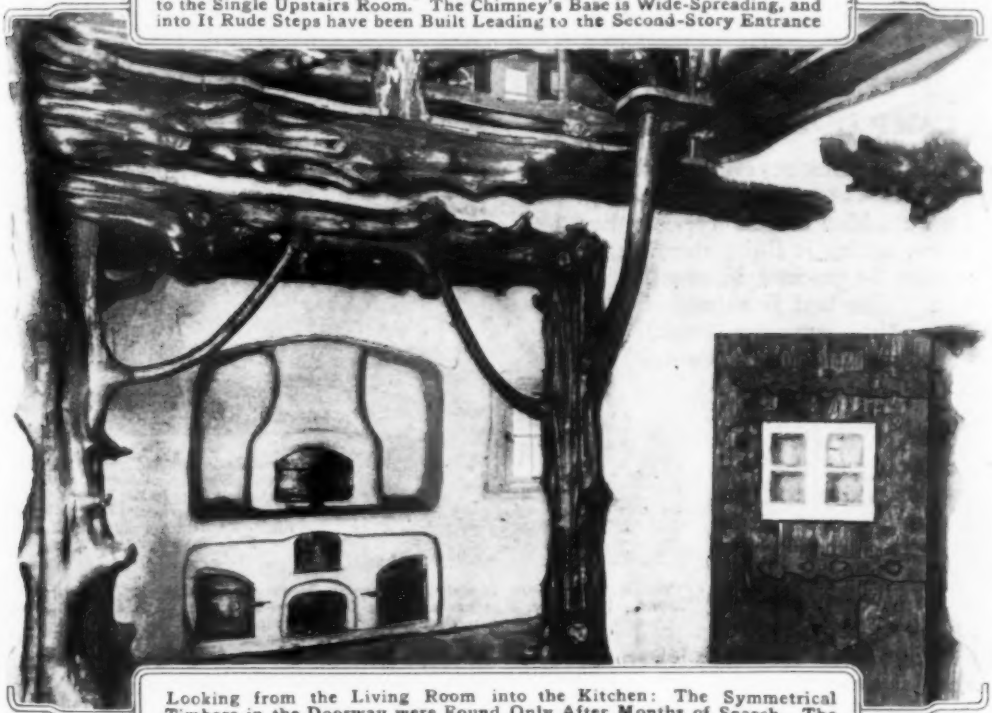
UNIQUE RUSTIC LODGE OF CEDAR AND STONE

AS an exquisite example of rustic architecture, a three-room cabin on the estate of a wealthy manufacturer has scarcely a rival. Gnarled cedar logs and limbs, smoothed and polished by nature's own processes, are the timbers used in the framework, each having been chosen as a result of long search and selected for a particular place in the structure. Cement and rough stones are the other principal materials used.

The Living Room, Showing Some of the Knotty, Weather-Beaten Cedar Logs and Limbs Used, Each of Which was Selected with the Greatest Care: The Support for the Stairs Is a Sycamore Limb



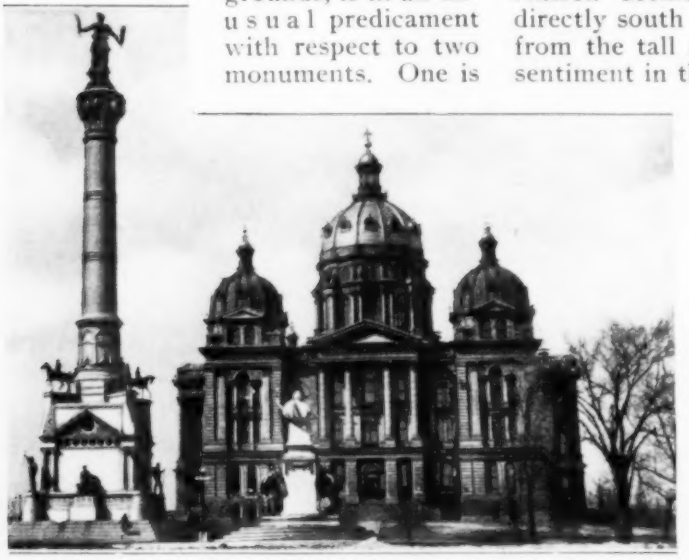
The Second-Story Room: The Railing and the Wall and Roof Beams Are Cedar. The Massive Chimney Has a Doorway Giving Access from Without to the Single Upstairs Room. The Chimney's Base is Wide-Spreading, and into It Rude Steps have been Built Leading to the Second-Story Entrance



Looking from the Living Room into the Kitchen: The Symmetrical Timbers in the Doorway were Found Only After Months of Search. The Hand-Wrought Doors of the Dutch Oven Are of Hammered Brass

ART AND SENTIMENT CLASH IN CAPITOL GROUNDS

The state of Iowa, having spent $2,000,000 in enlarging its capitol grounds, is in an unusual predicament with respect to two monuments. One is a tall Civil War memorial erected without reference to the present capitol's location. The plan has been to move it to the east approach. Anticipating this change, a smaller monument, the Allison Memorial, has been erected directly south of the capitol, not 20 ft. from the tall shaft. However, strong sentiment in the state induced the legislature to forbid the removal of the Civil War shaft, and the authorities cannot move the new monument because it has not yet been dedicated to the state. The effect produced is decidedly incongruous.

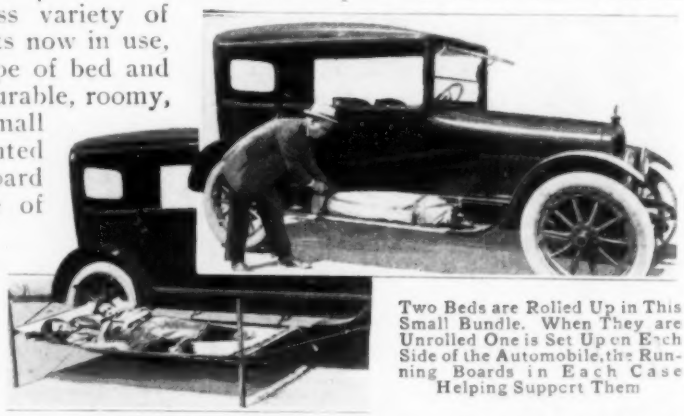


The Tall and Short Memorials on Iowa's Capitol Grounds: The Legislature has Forbidden the Removal of One Monument and the Other has Not Yet been Presented to the State

¶ About 25 minutes' motor run from Philadelphia, on the Lincoln Highway, the government has leased a site which will be used as a postal-service landing field for mail-carrying aeroplanes.

SIMPLE AND COMFORTABLE CAMP OUTFIT FOR AUTOS

To the almost endless variety of motorists' camping outfits now in use, may be added a new type of bed and shelter, which is light, durable, roomy, and can be packed in small space. The bed is mounted beside the running board and consists of a piece of canvas stretched between head and foot pieces of angle iron, rope lacing at the foot being provided to keep the canvas taut. The head angle iron is bent at one end and is inserted between the spokes of the rear wheel in such a way that it remains securely fastened, while the foot piece is attached beneath the running board. The opposite side of the bed is supported by adjustable uprights, and guy wires attached to the outer corners help to hold the framework in place. Shelter is provided by a piece of canvas hooked inside the automobile top and stretched across to the upright supports.



Two Beds are Rolled Up in This Small Bundle. When They are Unrolled One is Set Up on Each Side of the Automobile, the Running Boards in Each Case Helping Support Them

This Bed Consists Simply of Canvas Made Taut between Two Angle Irons. In Rainy Weather a Fly is Stretched from the Side of the Auto Top to the Bed Uprights

COMMENT AND REVIEW

THERE are three great days in the vocabulary of the small boy. One is circus day, another Christmas, but far greater is the Fourth of July. For this red-letter occasion he plans and works and saves for weeks, and the greater the noise and smoke, the larger his satisfaction. But these are times of war, and any spare powder should patriotically go across the sea to help shell out the kaiser.

A Fourthless July

Young America, however, notwithstanding his regret, will rise to the occasion with the true spirit of Valley Forge and turn his efforts to celebrate our greatest national holiday in other ways. To parents and the childless, the ban on powder will not cause any great regret, but gathering years should not dim the spirit of the day, nor make us forgetful of what it means to youth. The boys will give up their fireworks cheerfully and uncomplainingly, and it is due them that substitutes be provided which will appeal to them. In order to do so fathers and mothers might well get busy at once with plans. The boy who fails to have what he considers a suitable celebration feels a distinct loss which nothing in after years can recover or compensate.

Nor will it hurt the older ones to work back to the days when the picnic dinner in a shady grove followed the reading of the Declaration of Independence, and once again with renewed determination consecrate ourselves to our Flag and Country.

RAILROADS are, necessarily, large users themselves of coal. Something like 25 per cent of all the coal mined goes into the fire boxes of locomotives. It is evident then that any material saving in railroad consumption, becomes something very worth while. Among the many patriotic organizations of war times of which the general public knows little or nothing, is the Railway Fuel Association which held a congress in Chicago this week, to devise ways for further conservation of coal. From the many splendid addresses at that meeting, the following interesting high spots are selected:

Railroads Saving Coal

Few consider that practically all the freight and bunker coal which goes into ships must first be carried to the ships by rail, and the ships will from now on rapidly increase in numbers. This throws an ever-increasing tonnage on the railroads, to care for which enlists the best effort of every railroad man. The men whose uniforms are overalls will do their part as faithfully as the boys in khaki.

The estimated coal consumption on the railroads of this country, this year, is 166,000,000 tons, costing $650,000,000. Practically all boilers scale from impurities in the water, and a deposit of only 1/16 of an inch increases fuel cost 15 per cent. Scale ¼ inch thick is common, and this increases fuel cost 60 per cent. Failure to properly wash locomotive boilers alone cost in fuel wasted last year $50,000,000. Figures for stationary boilers are not given, but the loss there is in millions also. Firemen, engineers, and owners can all help in reducing this great waste by better care of boilers.

The necessity for keeping our general industries busy is scarcely less than that of the munitions works. Here the fuel cost is a little over 1 per cent of the total cost of manufacture, but this 1 per cent is vital. Hence the mine which produces 1 ton extra, or the family which saves 1 ton during the winter, has enabled the employment of 100 men one day.

How apparently insignificant economy aggregates astounding totals is shown in the statement that if locomotive firemen will save only one shovelful per mile the year's saving will amount to over 5,000,000 tons. This will provide factory fuel to keep 1,500,000 employed for one year. The same responsibility to save rests on every user of coal, large and small.

Since the war began the mine output has increased 200,000,000 tons. To visualize what this increase alone means, imagine 16 tracks stretching from New York to San Francisco and each completely full of loaded coal cars, and you will

have some conception of the enormous task which the railroads had in moving this immense traffic.

President Pratt in closing his address said: "It has been said 'Ships will win the war;' 'Food will win the war;' 'Coal will win the war;' but I tell you it is individual effort that will solve the fuel problem." And Mr. Noyes, of the U. S. Fuel Administration, in calling for maximum personal effort from every citizen in the land said: "Few men ever reach 100 per cent of their possible efficiency. Most of us never reach 50 per cent. Any man who through enthusiasm gets up to 75 per cent of his possible efficiency is a brilliant success in his field of endeavor. The only man I can think of who is up to 100 per cent of his possible efficiency is the drowning man." The rest of us can certainly do more than we are doing.

P. M. Idea in 1848

IN an ancient volume of the London Penny Magazine, one of our readers found the following quotation from the London Quarterly Review (1848), and it is very suggestive of the title of Popular Mechanics and the slogan underneath the title:

"The most obvious means of elevating the people, is to provide for them works on popular and practical science, freed from mathematical symbols and technical terms, written in simple and perspicuous language, and illustrated by facts and experiments which are level to the capacity of ordinary minds."

In other words, Popular Mechanics Magazine—"Written so You can Understand It," using simple if not "perspicuous" language.

Old Tire Day

THE enterprising citizens of Denver have set the rest of us an excellent example, which netted hundreds of dollars for a war fund. In a prominent and convenient location in the business section an "island" at a street intersection was chosen, and here upon a certain day the owners of rubber-tired vehicles brought their old tires. Some had run their last mile, some had blown out beyond repair, but many had yet a good lease of life, and when repaired sold for several dollars each. The big limousine, the touring car, flivers, motorcycles, bicycles, motor trucks—all were represented. The aristocratic tire which had carried the millionaire nestled beside the almost unrecognizable remains of a grocery-delivery truck. And rubber in all stages of exhaustion was not the only exhibit, as the lawyers say, but all kinds of metals, tons of them also, made a competitive hill. Fortunately the streets were wide and the island space large, or traffic would have had to take another route. From early morning until late at night a never-ending procession was in line waiting its turn to share in the good work.

The scheme is so simple, and requires so little preparation, it is recommended to every city and village in the country. The Fourth of July, wanting this year in its usual methods of celebration, might well serve as the occasion of an "Old Tire—Old Iron" day, and rival towns may derive considerable interest in their efforts to see which can show the larger pile.

Big Business Begets Big Men

GREAT events in history require great men, and likewise produce or discover them. Today in the forests of France are hundreds of magnificent specimens of American woodsmen, getting out timber for our engineering forces there. But it was a far cry from the days when Lincoln was a rail-splitter to those later days when he carved out the future of this country in its White House.

The present war is conducted on such a colossal scale that for many of our largest undertakings great managers must be found, not developed. Hence, when a few weeks ago, a master mind was needed to produce steel ships in quantities heretofore undreamed of, and in days, where months were formerly required, the President called to that tremendous task one who had already qualified himself for that work. And having chosen, the nation realizes with implicit confidence, that the man is equal to the responsibility.

There doubtless are men today operating small industries in iron and steel, in towns which are on the maps of their own county or state only, who, given time and opportunity, could develop the necessary qualifications to direct a vast shipbuilding campaign. In the urgency of our needs we cannot wait any more than we can wait for the spruce trees to grow which are needed to build the air fleet. The great surgeons of the future are among the internes of today, but they are not yet ready to undertake unusual capital operations. It is interesting then to note whence came this man.

Schwab is the product of Big Business; the very same Big Business which, until a few months ago, press, politicians, and people persecuted and roasted for years. Yet, had there been no great steel companies, there would not be today the man of the hour. Twenty years ago Carnegie was a mountain peak in steel towering above the others; but even Carnegie in the hour of his greatest strength, could not have done what Schwab is doing today, for the facilities and tools, in the shape of great steel mills, did not exist.

The natural ability, the cyclonic energy, the lightning action of brain in making decisions, and skill in organizing which Schwab possesses, are all admitted. He is a man who thinks in terms of tons, where other men grasp mental ounces. He is optimistic when others are discouraged; his enthusiasm and confidence of accomplishing the result carry such conviction to his men by thousands, that they undertake with assurance what yesterday seemed impossible: a leader who leads from the first instant, his very name signals successful results.

Yet with all his ability, his foresight, his wide vision and grasp, his magnetic influence as a leader—with all these he would still be unable to accomplish what he is doing, nor rise to the demands of the hour, but for the experience he has had in the schoolroom of Big Business.

It is but fair that those who have held only a narrow, one-sided view of large corporations, should now revise that conception. In fairness they should realize that in these days of the 20th century—a century starting out with all manner of Herculean ideas and unbelievable accomplishments—no nation can remain great, or become so, which does not deal wisely, even generously, with the vast organizations which are a part of 20th-century development.

Days of Promise

TIME was when fond fathers and mothers gravely held out to their small boys the hope of one day becoming president of the United States, if only they were faithful to the woodpile, or washed their faces and hands regularly before meals. As there are constantly something like five million small boys, and never more than one president, the chance has become what might be termed "a long shot," and Young America very soon discovers his chances and hopes some day to get on the police force, drive a fire engine, or be a locomotive engineer. While the dignity and honor which is due all useful labor belongs especially to these three occupations, yet none of them are schools out of which graduates can immediately step into posts of such responsibility, say, as that considered in the preceding lines. What can and should appeal to the boy old enough to have ambitions, and the young man who has begun to think, is the wonderful demonstration of skilled effort by the big men of the country who are being called daily to assume charge of this and that all-essential position of management, in order that we may win the war. These men were no less able a few months ago, but they were scattered geographically, and partly concealed by the limits of the industry they served. Now they are brought into action in such a manner their numbers become impressive, just as 10,000 soldiers, one each in 10,000 towns, are not impressive until they muster into one mass.

And what an inspiration to the young man! These men of power are big, not because of rich fathers, or influence, or any chance of fortune. They are Big Men because they willed and determined to be such. These men, every one, had they chosen, could today have been managing a peanut stand, or a popcorn wagon, instead of great departments of the greatest government on earth. Each one would have had more time to spend in perfectly harmless ways, which would have left them where they began. They certainly would have had more hours for sleep and pleasure, and infinitely less of work and worry and discouraging en-

deavor. But they always sought more responsibilities and places higher up, and both came to them.

Probably never in all the history of the world has so inspiring an example been presented to the young men of any generation. What they are doing, others in years to come can do. And never was there a time of such promise to young men of training and ambition as exists today, and will exist in a still larger measure when the reconstruction period after the war begins. In our own and all other countries the demand for young men who can do things in mechanics and engineering, farming, finance, and business, will be unprecedented. Those who have served in the war will have an experience in self-control and action they would never have attained in a lifetime of peace; those who do not go, owe it to their country and themselves to make the utmost effort to train their minds and hands in useful arts, and selecting some Big Man as an example, strive in every way to rise as fully as possible to the level he has reached, and even go beyond that. These are the days of large opportunities, and never before were there so many stepping stones in the way of books and schools and teachers. No young man need go without an education which shall make him proficient in at least some one branch of endeavor.

Young man, this is your day, and your opportunity is just ahead. However small you may be now, are you big enough to train to be one of the Big Men then?

It's up to you.

H. H. WINDSOR

May 24, 1918.

MISPLACED DAM CAUSES DAMAGE TO SHORE

Users of a dam across a stream at a point where the latter makes a rather sharp bend, have found that the placing of the barrier at a wrong angle has caused serious damage to adjoining land. The structure lies at right angles to the current, with the result that the water on passing over it continues straight ahead, striking the shore some distance downstream, and is rapidly wearing away the soil. At the same time a strong eddy just below the dam and adjacent to the same shore is constantly adding to the damage being done. Riprap has not proven effective in preventing the erosion. It is said that if the dam had been built at right angles to the shores the current would have more closely followed the natural channel, and no trouble would have resulted.

View Taken below a Misplaced Dam, Showing Eroded Shore on the Far Side of the Stream and What is Left of the Riprap Used in a Futile Attempt to Stop the Damage

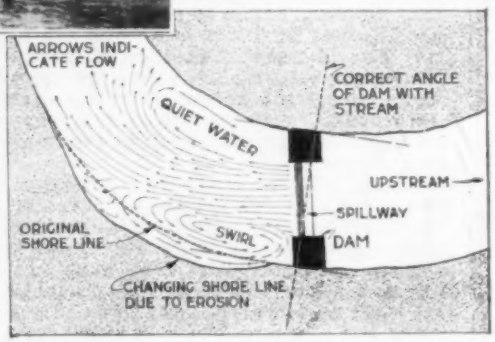
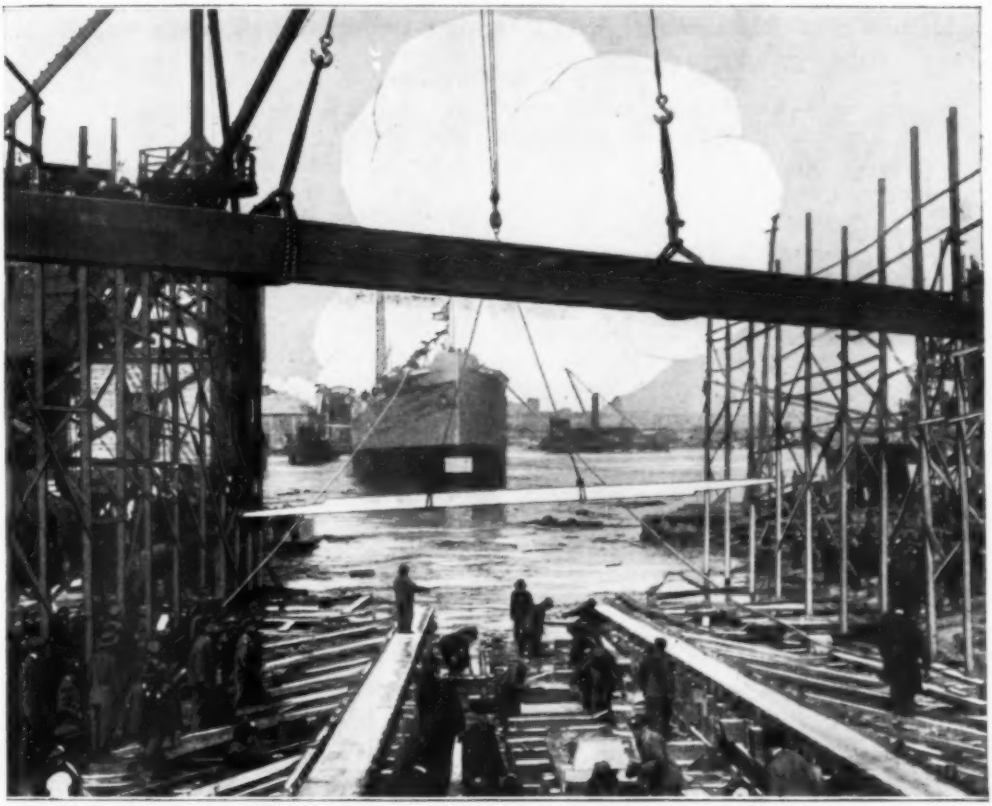


Diagram Showing the Misplaced Dam and the Course of the Destructive Current below It



One Minute After the "Accoma" Left Its Ways, Workmen Began Laying the Keel of Another Vessel. The First Beam being Swung into Position Is Visible in the Foreground, and the "Accoma" Afloat, in the Background of the Picture

NEW JERSEY SHIPBUILDERS SHOW BURST OF SPEED

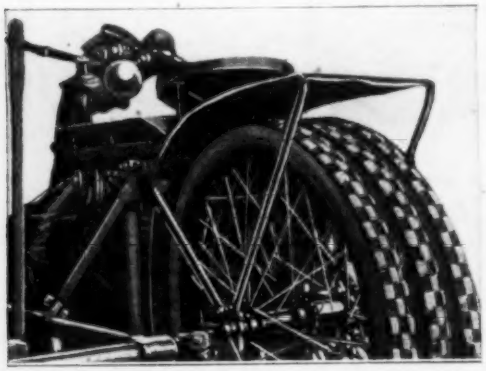
Two good examples of what war-time shipbuilders can do when put to the test have of late turned attention to New Jersey yards. Just 27 days 2 hr. 50 min. after construction of the 5,000-ton steel collier "Tuckahoe" was begun, the vessel slipped from its ways. At the time of launching it was announced that another 13 days would see the ship in service. All of which is a new world's record—for the time being. On the other hand, one minute after the "Accoma," a 3,500-ton wooden cargo boat, left the ways some days ago, workmen began laying the keel of another boat. The yard at which this speedy work is being done is operated by a firm of shipbuilders that has contracted to turn out an ocean-going vessel every month.

GRENADE THROWING NEWEST TRACK-MEET EVENT

A new event is being added to the list of athletic contests participated in at college track meets. It is grenade throwing. Dummy grenades have been placed on the market which are exact duplicates in weight and appearance of the deadly hand missiles employed by our men in the trenches. In recognition of the fact that correct grenade throwing may be something more vital than a mere accomplishment for our young men, college coaches are giving it a place along with shot putting and hammer throwing, indicating that even our sports are being affected by the world war.

DISPATCH RIDERS IN EAST USE "SANDCYCLES"

Motorcycles fitted with triple rear wheels are enabling British dispatch riders to drive through desert sands at



Showing Triple-Wheel Arrangement Used to Provide Traction for Motorcycle Operated in Sands at Eastern Front

the eastern front. Conditions that have compelled standard sidecar combinations largely to be abandoned in Palestine have thus been met. The arrangement is a simple one. Two wheels are joined by one cone and a special spindle. The third wheel, without spokes, is held between the other two by struts that bind all three rims rigidly.

STEEL BATTLEPLANE TURNS BULLETS WITH EASE

Armored battleplanes are quite well known to airmen of the western front, but the "flying tank," fantastically described as an all-steel biplane, apparently represents a radical development in German military air craft. If confidence is to be placed in first reports, the machine is intended primarily for low-flying operations against massed troops. It moves slowly and fights devilishly. Three-eighths-inch steel protects all of its vital parts and turns machine-gun bullets as if they were bird shot. The wing spread has been estimated at 60 ft. Two motors drive tractor propellers and are operated by one pilot. Protected positions are provided for two gunners who are said to wear armor. It was one of these machines, the first to cross the American lines, that brought to an end the dramatic career of Major Raoul Lufbery, America's foremost "ace," a short time ago. After six of his comrades had attacked in vain, he requested permission to go aloft. His speedy Nieuport mounted swiftly, attacked, maneuvered, and again attacked while hundreds of soldiers below watched. A slender red flame shot suddenly from the little craft. In another second there was a burst of fire and Lufbery, with 18 victories and decorations galore, took defeat. Rather than be burned, he jumped from a height of 5,000 ft. His comrades found his body buried beneath flowers that French peasants had picked in the little garden where he fell. A few days later it was reported that Lufbery's death had been avenged by French airmen who brought down the "flying tank."

OIL BARREL MAY BE USED AS DISPENSING TANK

Motor oil is conveniently dispensed from its original barrel by means of a combination attachment lately introduced for public-garage and service-station use. Any steel or wooden barrel is quickly converted into a portable self-measuring tank operated by compressed air. Adjustable plates protect the barrel heads.

¶Congress has authorized the coinage of 50-cent pieces, which will bear a special design to commemorate the 100th anniversary of the admission of the State of Illinois to the Union. The centennial is being celebrated this year.

BOOMERANGS

The Shooting Bayonet and the Tower of Ivory

By BRANDON TRACY

NEVER before in the history of the world have inventors been taken seriously by everyone. Fulton doubtless had a friendly listener who believed fully in the future of steam navigation, though history says nothing of this. Langley had his disciples, even though the great majority of people scoffed at "a steam engine with wings." Bell, Edison, and the rest of the great men who have made the world respect Yankee brains, all had their followers, but until today the inventor not only had to produce his goods, but demonstrate them time and again until he convinced an unwilling public. However, the war has changed all this.

Today the attention of three continents, at least, is focused upon invention and inventors. Various boards are established for the express purpose of making it easy for an inventor with a new war mechanism, explosive, or process to get his plans viséd and demonstrated. Dynamic war demands dynamic ideas. Even as startling a proposal as "Garabed"—known as the "utilization of cosmic force"—wins the attention and subsidy of congress. Everyone looks anxiously for a new weapon that will out-devil the Hun, and the inventor profits.

Sure-fire hand grenades, flammenwerfer, tanks, 145-mile-an-hour airplanes carrying fighting equipment, automatic cameras for aerial photography, anti-aircraft guns, blue and green-flame shells for aerial range finding, depth bombs and wireless-con-

"The second the two lines clashed at parapet and fire step, a queer thing happened! Instead of fencing and lunging with the bayonets, each Boche projected his bayonet like a steel arrow at the breast of his poilu adversary!"

trolled torpedoes are among the more startling mechanical successes that now are taken for granted.

The failures? Probably no attempt will ever be made to catalog the inventions that fizzled. Thousands of them already are shelved.

One natural consequence of the great desire for epochal inventions is, however, that some plausible inventions will be tried out in actual battle and found wanting, or even disastrous.

A shining example of how a plausible scheme gets by sometimes, is used in action and fails utterly, was the German infantry attack upon the French trenches back of Hell's Corner bridge over the Yser Canal at the Ypres salient. The bridge, controlled by the French guns, was an important transportation factor—or would be, the moment it was usable for either side.

A concerted attack of two divisions, supported by the heaviest possible fire from the German artillery, succeeded in forcing the bridge. This, however, meant nothing until the first two lines of French trenches, 120 yd. back of the canal, were taken.

What was left of the two divisions, after facing machine-gun enfilade in the crossing, stormed the trenches. Now in spite of carrying the longest, sharpest, and wickedest bayonet used by any of the combatants, Fritz is proverbially a poor bayonet artist. He lacks initiative and daring in this branch of combat. This time, though, he had a new trick to play, a means of overcoming his handicap.

Shooting as they charged across the 120-yd. death strip, the Boches swarmed into the first trench. Reserves had been rushed to meet them, and it looked like the direst slaughter. The second the two lines clashed at parapet and fire step, a queer thing happened! Instead of fencing and lunging with the bayonets, each Boche projected his bayonet like a steel arrow at the breast of his poilu adversary!

A few of the French were painfully wounded by this strange attack, and a half dozen or so were killed outright by lucky hits, but in the main the bayonets, though coming with the force of a strong spring, either were deflected entirely or caused light flesh wounds. These did not daunt the poilus, who returned to the combat with redoubled vigor.

Then, of course, the Germans, left defenseless by their trick, paid the penalty. Thousands were killed, and a greater portion of the remainder, after seeing how futile the spring bayonet really proved, surrendered instanter. The attack was a complete failure, a boomerang in all senses of the word, for after the first surprise the Huns had nothing to fall back upon.

Thousands of the spring-bayonet guns were captured by the allies. These possessed, in addition to the regulation equipment, a guard and spring that released by means of a wire arm attached to the trigger guard. For a space of eight or ten feet the bayonet thus would fly point foremost, but the force behind it was not as great as that delivered by two muscular arms. In many cases the antagonist's uniform turned the point. The allies, after examining the weapon and analyzing its possibilities, decided it could not be made practical.

At Havrincourt Wood, eight miles northeast of Bapaume, the Boches had their west-front airdrome headquarters until the beginning of the drive on Amiens. On the edges of this shamrock-shaped forest no less than 20 large airdromes were situated, each under the direction of one of the German air stars. During the reign of Boelcke, the best-advertised if not the greatest of German sky duelists, the headquarters was never really endangered.

Later, however, the British Royal Flying Corps established a chain of airdromes near Bouchavesnes, and gradually increased the number of planes, personnel of fighters, and ability. Raids on the German headquarters became ordinary, though at first they met with no startling success. The incessant worry kept more and more Boche planes at home for defensive purposes as time went on. As

the allied fliers grew more able they veiled their reconnaissance flights by making raids on Havrincourt Wood simultaneously.

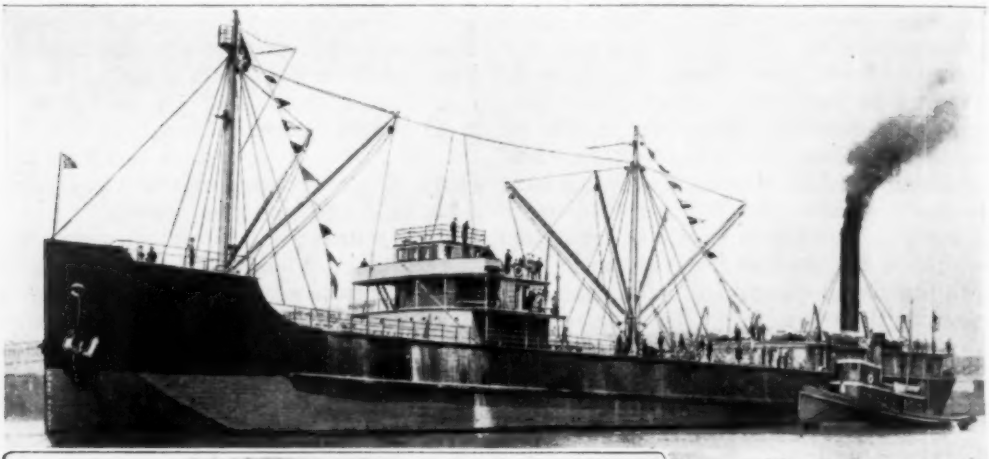
Then came the "tower of ivory." This queer phenomenon was one of the most spectacular sights of the whole war. It looked to be a thick column of creamy white smoke of a peculiar sticky consistency. It rose from the ground to a height of 6,000 or 7,000 feet, and sprayed at the top until the bulging cloud resembled a huge mushroom at the top of a gigantic stalk. The Germans would send it up at times when there was little or no wind, and it would remain for upward of a half hour before it dissipated.

The roots of this odd growth were in the ground at a point near the center of the cluster of German airdromes. As the apparition seemed to do no harm, no allied flier went near it, but speculation was rife concerning it. The prevailing opinion settled into a belief that it was an attempt by the Boches to poison the air above their headquarters so that enemy planes could not attack.

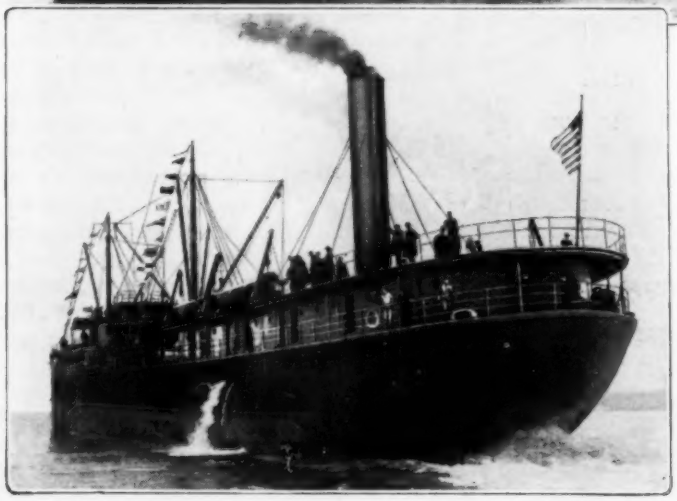
The last occasion on which the "tower of ivory" appeared put it in the class of boomerangs without a doubt. Through atmospheric conditions, or for some unexplained reason, this time the column did not remain stationary in the air until currents wafted it away, but majestically and slowly descended on its own base, filling the greater part of Havrincourt Wood with the sticky vapor. For two days after, the fliers who passed over Havrincourt went unchallenged, and one British airman, flying low, reported a suffocating stench of phosphorous gas rising from the region. That experiment apparently was enough.

"Then came the 'tower of ivory.' This queer phenomenon was one of the most spectacular sights of the whole war. . . . It rose from the ground to a height of 6,000 or 7,000 feet, and sprayed at the top until the bulging cloud resembled a huge mushroom at the top of a gigantic stalk."

CONCRETE VESSEL "FAITH" MAKES GOOD SHOWING



The "Faith" as It Appeared on the Day It Showed Faster Speed Than Its Builders and Owners had Expected



View from Astern, Showing the "Faith" under Way during Its Trial Trip in San Francisco Bay

Six weeks after its launching at Redwood City, Calif., the appropriately named concrete ship "Faith," the biggest vessel of its kind thus far constructed, made a trial trip in San Francisco Bay, before attempting the final tests at sea. Built to do about 11½ miles an hour, the boat sprang a surprise by averaging better than 12½ miles. Not only did it show itself as steady in the water as a steel freighter, but it also showed scarcely any vibration. The "Faith," with dead-weight carrying capacity of 5,000 tons, is now in service. Although time is the only sure test, it would seem as if vindication of concrete as a shipbuilding material is at hand. A fleet of 14 concrete tankers, totaling 105,000 tons, has been ordered and when completed will be added to the American merchant marine.

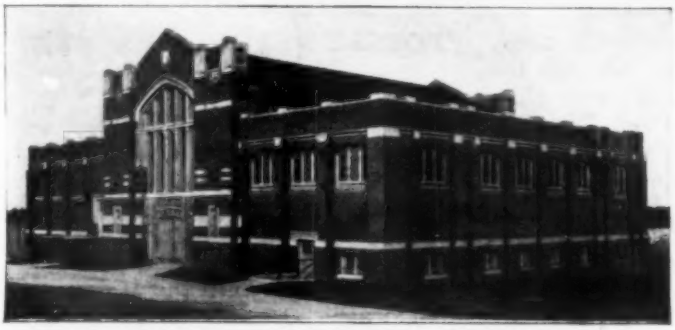
SCIENTIFIC BUTCHERING IN MEATS LABORATORY

The splendid new meats laboratory and abattoir which has been completed for the agricultural college at Ames, Ia., is impressive evidence of the strides made in the science of animal husbandry in recent years. The high cost of meat has greatly aided colleges of this type in discrediting the old-time insanitary slaughter houses and the wasteful methods employed in them.

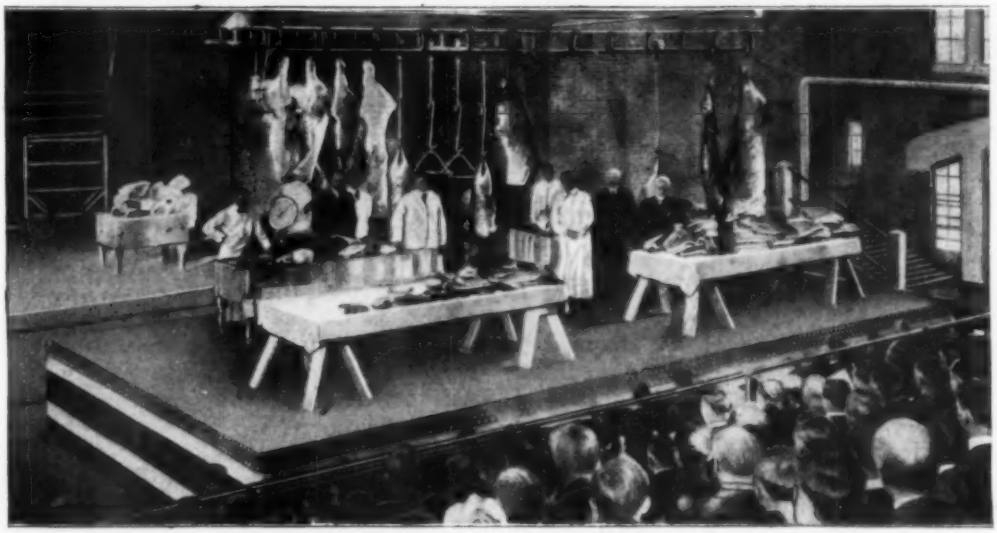
The new structure is of brick and concrete and in it is a central arena covered with tanbark where stock can

be judged in the presence of several hundred spectators, for whom seats are provided on an inclined floor. If, as is often desirable, judges wish to verify their opinions regarding a live cow or steer, for example, by cutting up its carcass, the creature is driven up a chute and killed with a hammer blow. The students then dress and cut the meat under the guidance of experienced butchers on a platform erected for the purpose in the arena. A large scalding tank is provided for hogs. If carcasses are not wanted for exhibition or demonstration purposes they are sent via overhead carriers to the cooling rooms. Sausage machines, a hydraulic lard press, and a smokehouse are also part of the equipment. Every

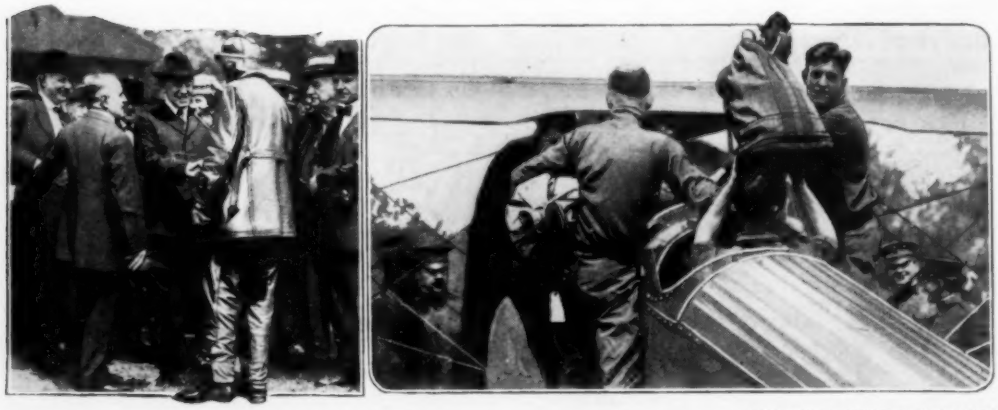
Animal-Husbandry Students Learning by Practical Experience How to Dress Carcasses



New Animal Husbandry Meats Laboratory of Iowa State College, Equipped to Teach Various Branches Relating to Live Stock, and for the Scientific Study of the Meat Business



Demonstration Platform Erected in the Arena of the New Meats Laboratory: This View Shows the Facilities Provided for Handling Carcasses and for Exhibitions of Meat Cutting and the Like before a Large Number of Students



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Left: President Wilson Shaking Hands with Lieut. George L. Boyle before the Latter's Departure from Washington with Mail for Philadelphia and New York. Twenty Minutes Later the Pilot was Forced to Land at Waldorf, Maryland. A Broken Propeller Prevented Continuation of the Maiden Northward Trip. Right: Placing Mail in the First Postal Plane to Depart from the Capital for Philadelphia. A Few Hours Later the Mail Plane from Philadelphia Reached Washington with 5,000 Letters

student taking this work must do with his own hands everything that has to be done in dressing, cutting, and preserving beef, hogs, or mutton.

PONCHOLIKE BED GARMENT FOR SICK OR WOUNDED

With a view to overcoming the discomforts caused by the customary bed apparel worn by hospital patients, a bed garment has been designed that can be put on or taken off with a minimum of inconvenience. In shape it is similar to a poncho with an opening in the center for the head. Instead of being sewed down the sides, tapes are provided by which the front and back can be tied together, loosely or tightly as desired. With this garment, allowance can easily be made for bandages and the wearer can be bathed without removing it.

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This Bed Garment is Made Like a Poncho, the Front and Back being Tied Together with Tape. It can be Put on or Taken off a Patient with a Minimum of Inconvenience to Him

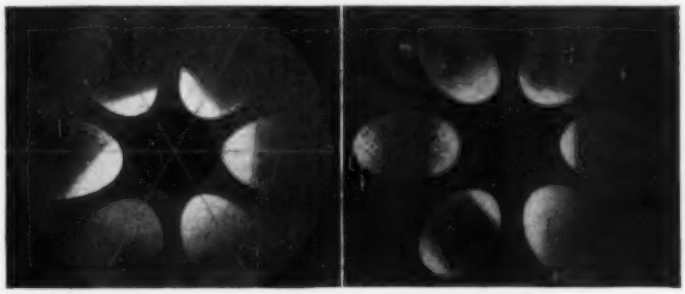
POSTAL AEROPLANES MEET MISHAPS AT OUTSET

Inauguration of aeroplane mail service between New York, Philadelphia, and Washington, May 15, was marred by a mishap that prevented delivery that day of mail dispatched from the capital to Philadelphia and New York. On the second and third days, the hoodoo still pursued the postal pilots. The southbound plane from Gotham became lost in a fog and was forced to land off its course at Bridgeton, N. J. Mail did not reach Washington until 8:35 in the evening. The northbound pilots met with better fortune. Leaving Washington on time, at 11:30 a. m., mail landed safely at Belmont Park flying field, New York, in the afternoon, at 2:58 o'clock. On the third day mail for Philadelphia and New York from Washington reached the Quaker City at 7:25 p. m., after the plane had been smashed on the way. While the record is not at all a complimentary one for American war-time aeroplanes, there is reason to believe that a few weeks will show a big improvement in the service.

¶The government has ordered 1,000 soles of poplar and maple to ascertain whether they will prove a satisfactory substitute for leather soles on the soldiers' shoes.

CAMERA USED IN NEW EGG-CANDLING PROCESS

Bad eggs are unfailingly detected by the camera. This has been demonstrated in France, where experiments are being conducted with a photographic egg-testing apparatus. The idea of utilizing the camera instead of the human eye for candling is a new one. So far it has not been carried past the laboratory stage, but even though obstacles prevent its commercial utilization at present, it is of more than passing interest. Eggs are held in a half dozen oval holes provided in a metal plate. Their large ends point toward a common center. While intense light is passed through them, they are photographed. A powerful lens is used and an exposure ranging upward to three minutes is made. The result is a picture that shows the size of the air chambers in the eggs. A transparent gauge consisting of concentric circles crossed by six lines radiating from the center is placed between the negative and sensitive paper in printing. The presence of these lines in the finished photograph aids one in comparing the size of an egg and the air chamber within it, which gives an index to its age.

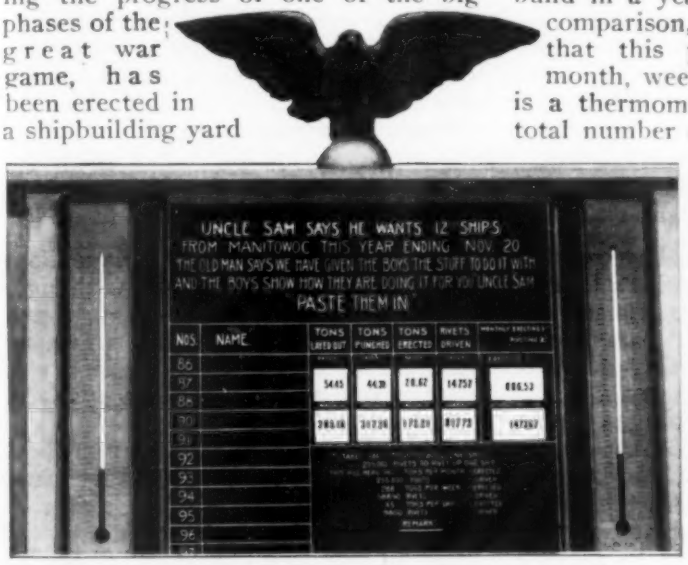


COURTESY OF LA NATURE

These Pictures Show How Eggs of Various Ages Look When Subjected to the Scrutiny of the Camera. The Photograph at the Left Has the Imprint of the Transparent Scale That is Used in Judging the Age of the Eggs

SHIPBUILDERS' WORK TOLD ON NOVEL SCOREBOARD

A very effective scoreboard, recording the progress of one of the big phases of the great war game, has been erected in a shipbuilding yard to stimulate the organization to a maximum of effort. On it are stated the number of ships which the company has been asked by the government to build in a year, and, for purposes of comparison, the amount of work that this program requires each month, week, and day. Either side is a thermometer, one indicating the total number of rivets driven and the other, the tons erected. Bulletins also show the current monthly, weekly, and daily records in tons laid out, punched, and erected.

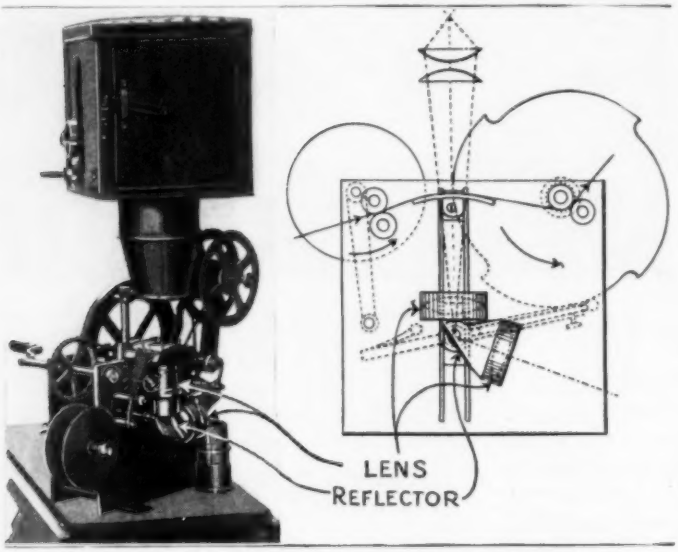


A Bulletin Board Giving Data on Work Completed and to be Done in a Shipbuilding Plant

¶The government is considering the establishment of a plant on the Pribilof Islands, Alaska, in which oil will be extracted from seal carcasses that are now thrown away after being skinned.

MACHINE FOR PROJECTING FLICKERLESS PICTURES

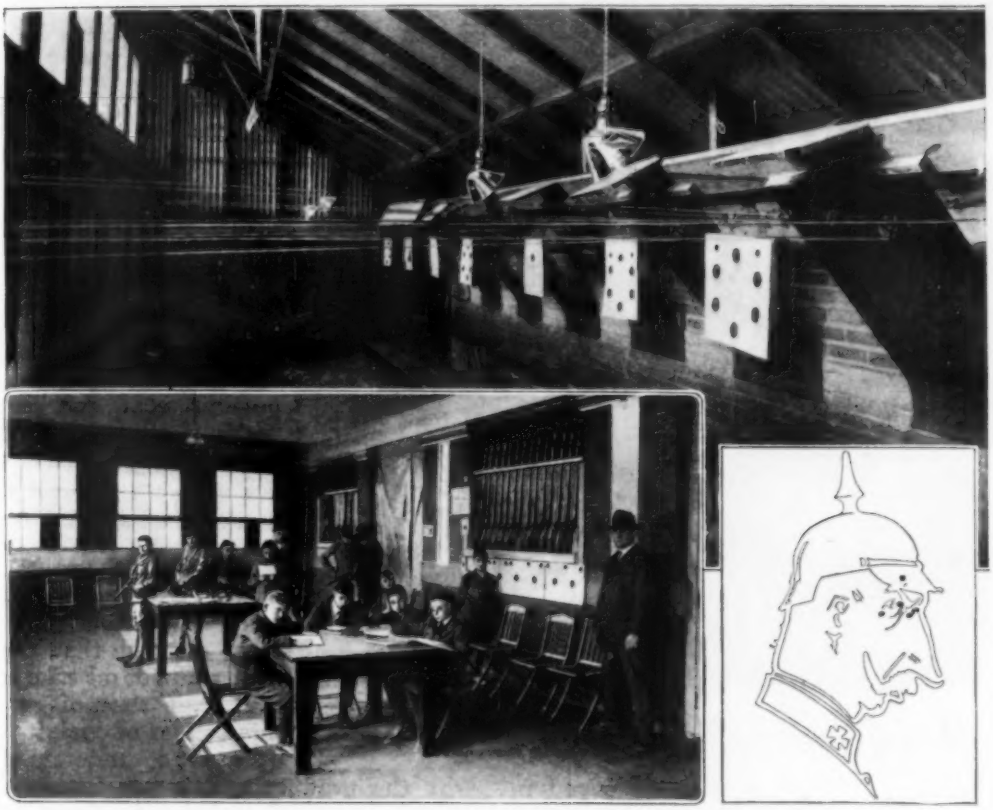
To provide flickerless moving pictures is the object of a new projection machine of current development. The goal is one that many inventors have striven to reach, and of course holds interesting possibilities. The latest scheme, like certain previous ones, arranges for a continuous uniform movement of the film, instead of the intermittent motion now universally used. This is accomplished by employment between the lenses of an oscillating prismatic reflector that moves in synchronism with the film and compensates for the interval of time in which the change from one picture to the next is made. The reflector is arranged for adjustment so as to regulate the distance between it and the film. This also entails regulation of the oscillating movement, for the angle required depends upon the distance between the two members. The movement of the reflector is what holds the projected image steady on the screen, despite the constant movement of the film. Thus the actual starting and stopping is in this case done by the light, rather than by the film. The time spent by the prism in changing from one picture to the next is about one-sixtieth of a second, much too fast to be detected by the eye. The mechanism is arranged in a simple manner. A large cam, mounted on the same shaft that carries one of the film-moving sprockets, operates a lever which rocks the reflector synchronously.



As is Explained Clearly in the Drawing, the New Movie Projector Pictured Above is Supplied with an Oscillating Prismatic Reflector That Compensates for the Interval of Time in Which the Change from One Picture to the Next is Made. This Arrangement Enables the Film to be Moved Continuously

ROOF-GARDEN RIFLE RANGE FOR DETROIT MEN

Of late years conditions have worked to the detriment of America's legendary title as a nation of marksmen. Influenced somewhat by the war, however, rifle and pistol shooting as sports are again coming into their own. Clubs are being formed and ranges established in many cities and towns. One example is to be found at Detroit atop the Y. M. C. A. building in the downtown section, where advantage has been taken of the chance to provide a really worth-while indoor gallery. There, under competent tutelage, boys and men are practicing daily with high-power rifles and businesslike revolvers. In addition to its recreation value, intelligent and consistent use of a rifle enables one to develop keen eyesight, steady nerves, and moreover self-possession in intense moments. These are some of the good things that members of Detroit's Y. M. C. A. rifle club are gaining. A pergola on top of the building has been glazed and roofed to form comfortable quarters. Back of



At the Top are Shown the Steel Backstops, the Targets Movably Mounted on Piano Wires, and the Lighting Equipment. The Other Photograph Gives a Glimpse of the Clubroom. The Perforated "Wilhelm" Target at the Right Bears Evidence of the Marksmanship of Those Who Use the Range

this is the inclosed range, 75 ft. long, equipped with disappearing tables for prone shooting and movable targets that may be set at various distances. Curved steel plates fastened to a wall serve as backstops and deflect the bullets into a sandpit below on the floor.

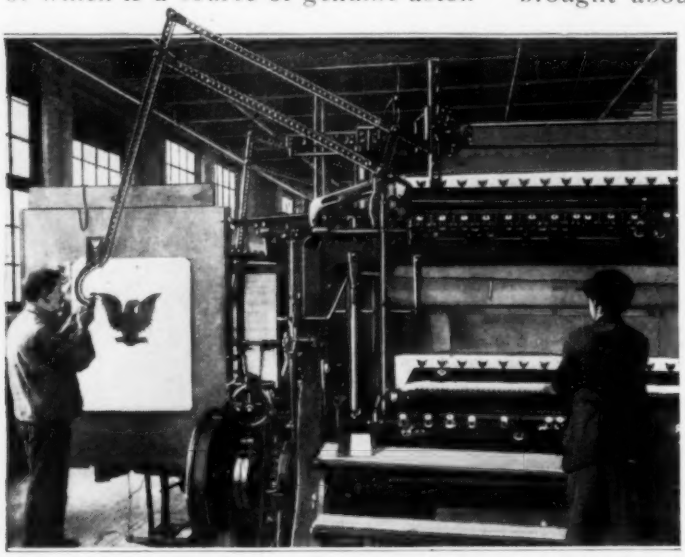
OPEN VENTILATED LOCKERS FOR SCHOOL CHILDREN

That each pupil may hang his or her coat and hat so as not to be in danger of contamination by contact with the apparel of others, lockers of a new type are being installed in certain schools. They consist of semicylindrical steel units made so that additional lockers can be joined to them as desired. The upper ends are covered, while the lower ends, which come within a few inches of the floor, are open, as are also the fronts. In the back of each locker is an air vent connecting with a common ventilating duct through which the air is drawn off. If desired, doors may be added.

The Sanitary Substitute for the Row of Clothes Hooks in the School Cloak Room: Ventilators Draw Off the Air from Each Locker

EMBROIDER MANY CHEVRONS AT ONCE BY MACHINERY

An embroidering machine, the work of which is a source of genuine astonishment to a layman, is employed in fashioning chevrons wholesale, for our soldiers and sailors. It embroiders 180 identical designs at one time. To the left of the machine, which is shown herewith, stands the stitcher who traces with a pantograph arm, an enlargement of the design being embroidered. The woman worker rethreads the needles when the threads are accidentally broken. The designs made in this way are, of course, far more accurate than if done by hand.



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A Machine That Embroiders 180 Chevrons at Once: The Man at the Left Traces the Design with the Arm of the Pantograph, While the Woman Rethreads the Needles When the Threads Break

FRENCH PLANTS PRODUCE WAR FIREWORKS ONLY

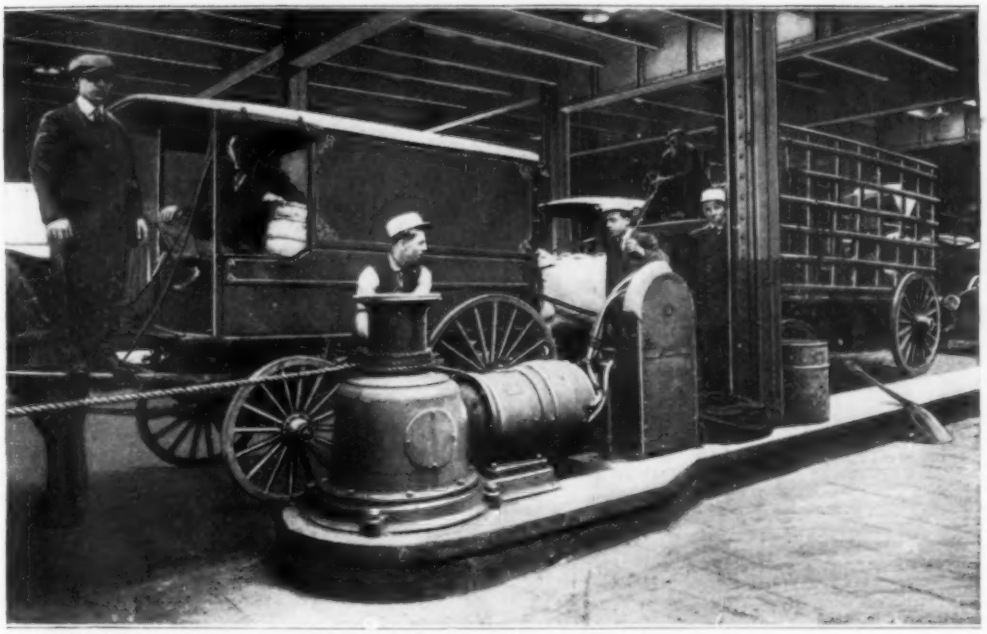
A number of views of French fireworks manufacture appear on pages 78 and 79 of this issue, but we neglected to state there that these pictures were taken before the war. All plants of this type are now engaged in war activities and the only fireworks produced are flares rockets, and other signaling devices for use on the battle fields.

OIL CAKE PROVES CHEAPER THAN COAL IN EGYPT

One of the peculiar conditions brought about by the war is that in Egypt it has been found cheaper to burn cottonseed-oil cake than coal. That country produces annually about 85,000 tons of oil cake in excess of domestic needs. But now ships are scarce for importing coal and exporting oil cake, and consequently coal is $80 per ton while the price of the other commodity has ranged from $32.50 per ton down to the present price of $15. When tests showed that the heat value of oil cake is over half that of certain grades of coal, it is easy to understand why the product which was formerly exported was shoveled into furnaces in boiler plants, houses, and hotels. The ash from the cake is worth about $25 per ton as fertilizer.

DUPLICATE OF MILITARY PISTOL A WATCH FOB

An artistic product of a skilled worker in metals is a revolver, 3 in. long and weighing less than an ounce, which serves as a watch fob. Its caliber is .094 in. and in design it closely resembles a well-known military revolver. The cartridge cylinder revolves and swings out at one side, allowing the tiny brass cartridges, with which it is loaded, to be pushed out by an ejector. The steel parts are blued and the handle is covered with mother-of-pearl.



COURTESY OF THE EDISON MONTHLY

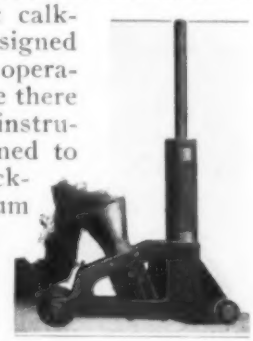
Here One of the Power Winches Is at Work Helping Horse-Drawn Vehicles Negotiate an Inclined Gangplank at Low Tide. Not Many Years Ago It Was a Common Thing to See Trucks Stalled between Street and Ferry

ELECTRIC WINCHES BIG AID IN HANDLING FERRIES

Conspicuous things often consistently escape one's notice. Therefore it is possible that many New York commuters who daily use the Staten Island, Fulton, and other ferries have scarcely observed the extent to which electric power is being employed in handling these and larger boats at their slips. The old-time hand windlass is gone, and ferries as well as steamers are drawn snugly to their docks in a twinkling by motor-turned capstans. Suspension gangplanks also are raised and lowered by electric hoists on many modern ferries that discharge from their upper decks. Once it was a common thing to see horse-drawn wagons stalled between street and boat on the inclined gangplanks at low tide. Now the power winch lends a hand. A rope extends from it to a pulley at the head of the incline and passes back to the truck in trouble. The current is applied, and up goes the wagon. Changes of this sort have been made during the last five or more years.

HIGH-SPEED SELF-FEEDING SHIP-CALKING TOOL

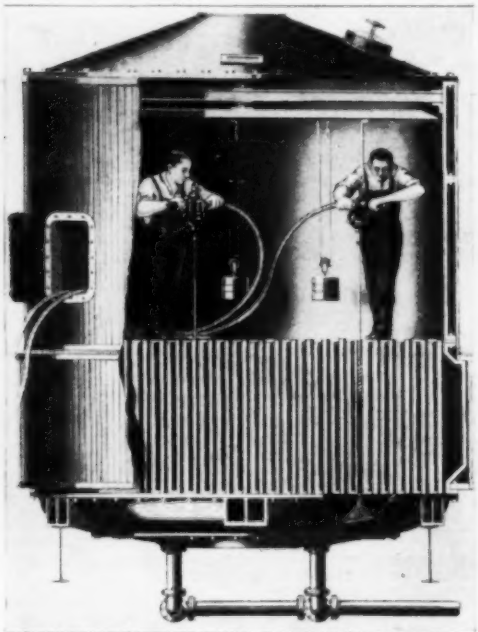
Revival of the wooden shipbuilding industry has inspired the invention of several pneumatic calking machines designed for high-speed operation. Among these there is a self-feeding instrument that is claimed to be capable of packing tarred oakum in about 4,000 linear feet of seams in a normal working day. When subjected to rigid government tests it performed most satisfactorily.



SUGAR EVAPORATOR CLEANED QUICKLY BY MOTOR BRUSHES

For removing scale from the hundreds of vertical tubes in sugar-refining evaporators, pneumatic motors are being used to revolve the stiff wire brushes designed for such operations.

Heretofore this work has been done manually and has required hours of hot, tiresome labor. The air motors



Cleaning the Tubes of an Evaporator with Motor-Driven Wire Brushes That Remove Scale Quickly

now used are suspended from pulleys operating along an overhead track, and are counterbalanced. They enable a workman to do in four hours what formerly consumed a minimum of 10 hours.

WELDING TORCH POSSESSES TIME-SAVING FEATURES

Of interest to welders is a new pistol-grip torch with thumb and forefinger triggers controlling the oxygen

Thumb and Finger Triggers Control the Flow of Oxygen and Acetylene. All the Valves in the Torch Are Interchangeable

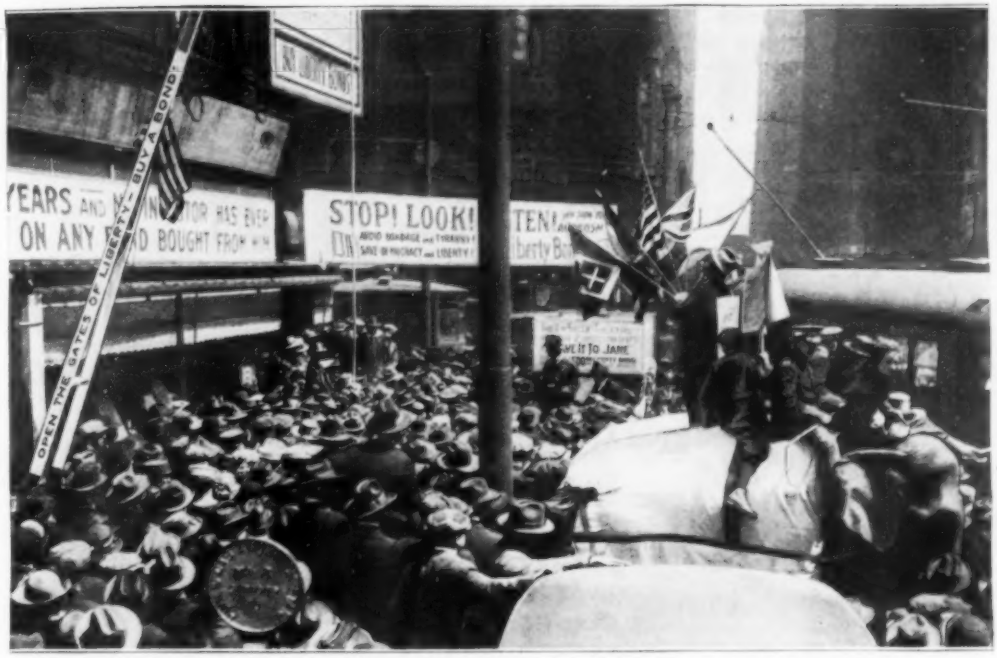
and acetylene. The flame is ignited by a pilot, while the tip and hose connections are supplied with breech-lock threads that enable an operator to disconnect them with a quarter turn. Attached to the grip is an arm rest of value when long jobs are in hand. Check valves in the handle protect both hose lines and eliminate danger of back-firing. In an emergency, the acetylene may be shut off and the device converted into a cutting torch simply by increasing the oxygen flow. Because it is capable of operating when the acetylene pressure is as low as a half pound, it is able to utilize tanks that have been discarded as empty.

BARN AND SILO COMBINED SAVE FARMER'S MONEY

By erecting a barn so that a silo was incorporated in one end of it, a farmer saved more than $100 in material and labor costs. Had the barn been placed a few feet from the silo, as is common, a connecting shed would have been desirable, if not necessary. Part of the saving resulted from making an extension of the barn roof serve as the silo roof. The farmer saves much time in handling ensilage by being able to throw it directly from the silo into the barn.

TRAFFIC IN JAMMED STREET HALTED BY BOND BOOSTERS

Toll gates were installed at one of Madison Street's busiest intersections in the heart of Chicago's loop district during the latter days of the recent Liberty Loan campaign. Soldiers, sailors, and attractive young women were stationed at the corner as subscription collectors. Liberty buttons were passports for pedestrians, and

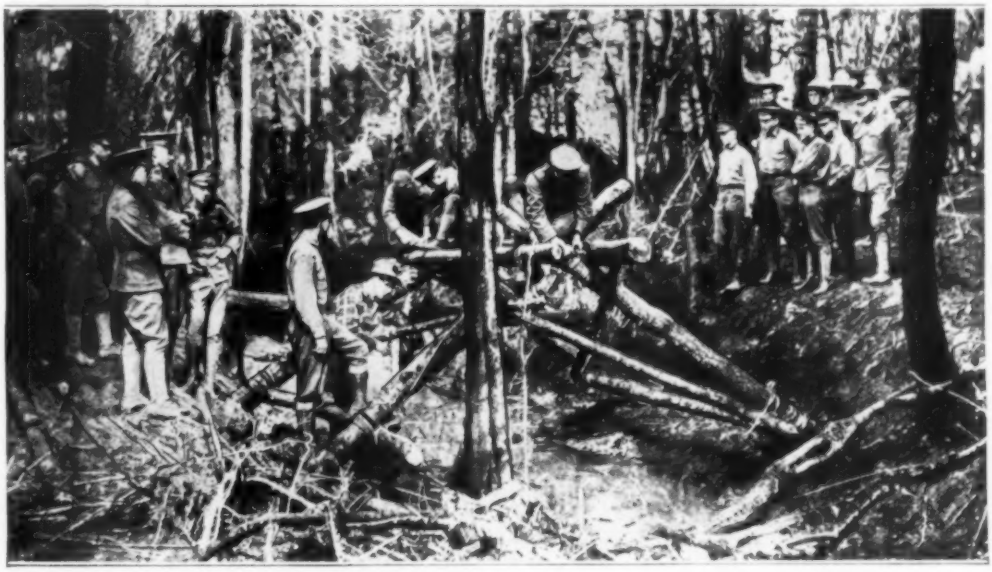


Typical Scene at Madison and Clark Streets, Chicago, Where Toll Gates were Effectively Used during the Third Liberty Loan Drive

those who possessed none were escorted to a booth by stalwart sailors and bronze-faced soldiers who were "stone-deaf" and unable to read anything except properly filled subscription blanks.

STUDENTS LEARN TO BUILD MILITARY BRIDGES

Included in the practical course given cadets in a western agricultural college is instruction in building mili-

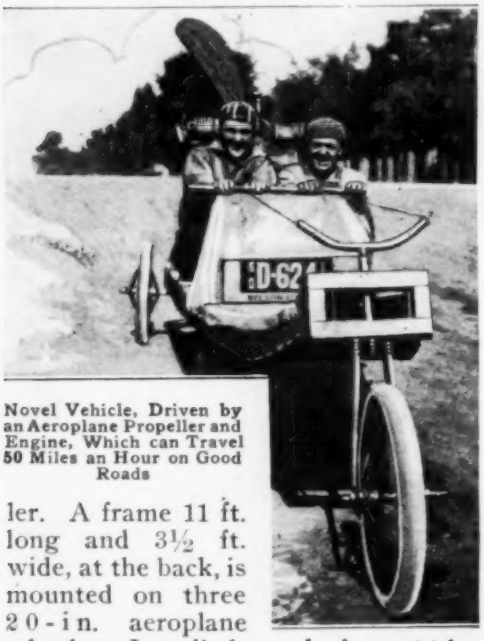


Not in France but in Western United States: Cadets in an Agricultural College Lashing Poles Together to Make a Military Bridge

tary bridges. These bridges are of the lashed-spar type, one or two spans, and generally are built of alder or ash with ropes which the students carry. The men become very adept in this work which is carried on under conditions duplicating, as nearly as possible, actual campaigning.

FAST AERO-TRICYCLE MADE FROM AEROPLANE PARTS

Aeroplane parts have been ingeniously used in making a very speedy vehicle that is driven by an air propeller. A frame 11 ft. long and 3½ ft. wide, at the back, is mounted on three 20-in. aeroplane wheels. Installed on it is a 14-hp. aeroplane engine connected with a 5-ft. propeller, at the rear. With two persons in the seat, located in the center of the frame, the car can travel 50 miles an hour on good roads.



Novel Vehicle, Driven by an Aeroplane Propeller and Engine, Which can Travel 50 Miles an Hour on Good Roads

COLLEGE WOMEN'S WAR WORK VARIED

Splendid resourcefulness and inspiring patriotism are pictured in a recent governmental survey of war work being done by women in college. Among the special courses that are being pursued by considerable numbers of young women are agriculture, nutrition and food values, wireless telegraphy, radio engineering, automobile mechanism, bookkeeping, and map drawing. One school is giving a training course for women dental hygienists, and a middle-western state college has 150 women studying to become electrical engineers. Colleges that have held particularly to the cultural ideal of education are upsetting tradition by offering courses in home nursing, home economics, stenography, and so on.

Women students' "outside" activities are equally varied. The publication of one school paper was suspended and its revenue devoted to war work, the news and advertisements being written out by hand and read aloud to the student body. War bread has found a place on dining-hall menus certain days each week. Personal expenditures have been curtailed, candy and fancy dresses coming under the ban.

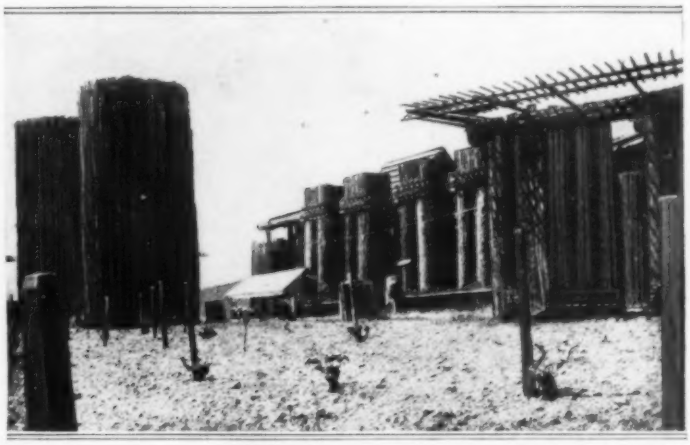
BIG DYNAMO ADVERTISES CANADA'S LOAN

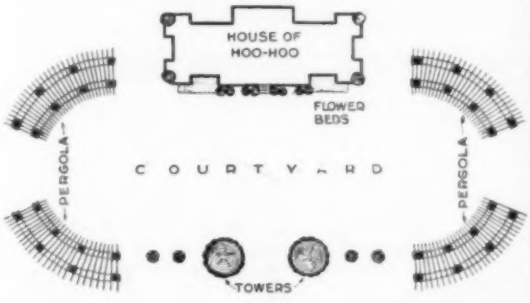
A big dynamo, mounted on a high pedestal and kept running by a hidden motor, was employed in Ottawa, Ont., to advertise Canada's recent "Victory Loan." The legend "Boost the Voltage" on the pedestal emphasized the patriotic appeal. A big voltmeter, whose hand kept vibrating slightly to attract attention, indicated the number of millions subscribed.

Supplying Power to the Armies in Europe: A Big Dynamo and Voltmeter Set Up in Ottawa, Ontario, to Advertise Canada's "Victory Loan"

"HOO-HOO HOUSE" A UNIQUE COMMUNITY CENTER

For originality of design the civic center and home of the local board of trade at Monte Vista, about 40 miles south of San Francisco, is probably without an equal. The "House of Hoo-Hoo," as the truly fantastic structure is called, occupies a commanding site and opens on an oblong courtyard inclosed by pergolas built of massive logs and poles. Forming a gateway to this inclosure are two redwood tree trunks, hollowed out, measuring 60 ft. in circumference and some 50 ft. high, while flanking these on either side are smaller pillars, some of which are solid and weigh as much as 15 tons.





Above: The Court in Front of the "House of Hoo-Hoo." The Massive Pillars at the Left Are 60 Feet in Circumference. Below: The Front Façade of the Structure is Shown, While the Diagram Shows the Ground Plan of the House and Courtyard

The exterior of the house, which is a building about 100 ft. long, is covered with bark. Within are a big reception room and several anterooms, richly furnished, the walls of which are adorned with panels of polished woods of many varieties. All modern conveniences are provided. The house was moved from the San Francisco exposition grounds where it sheltered a lumbermen's exhibit. It derives its name from an order of lumbermen who were instrumental in its construction, and it is now thrown open to the public for community gatherings as well as for use by various societies.

SOLDIER'S INDESTRUCTIBLE PRESCRIPTION

An indestructible prescription for eyeglasses has been invented by a Chicago oculist, adding one more practical and ingenious idea to the many already born of war necessities. George M. Sturgeon was a Chicago young man who had gone to western Canada to farm on a large scale. He enlisted in the Canadian army and for months drove ammunition trucks nightly out to the front. One night something blew up, and the next Sturgeon knew

was three weeks later, in an English hospital. The doctors there mended his bones, but no one seemed able to fix his eyes, which could not distinguish objects beyond 50 feet. He returned to this country to consult his former doctor, who succeeded in devising glasses which restored his vision completely.

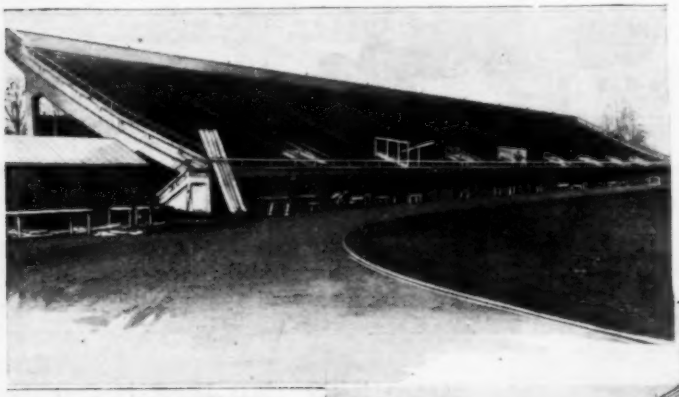
He returned to Canada and joined the flying corps there. He is now on his way across.

But everything depended on his new glasses. If anything happened to them, where would he replace them? His doctor solved that difficulty by stamping the prescription on a thin piece of aluminum about 4 in. long. This will last a lifetime, can be carried in a box of tools without harm, and with this prescription any optician in the world can make the precious glasses, whenever it is necessary to replace them.

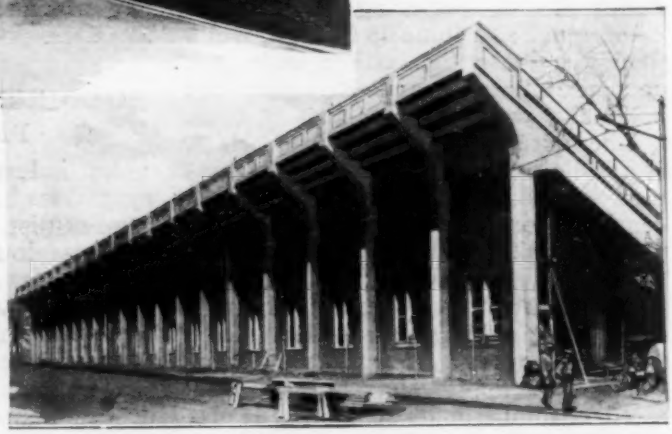
To Render the Prescription Nearly Indestructible It was Stamped on a Piece of Aluminum

BLEACHERS TRANSFORMED INTO BARRACKS

The reinforced-concrete bleachers on the college athletic field at Ames, Ia., have been transformed into a barracks. The area beneath the bank of 5,000 seats has been inclosed by a brick wall at the back and ends to provide accommodations for several hundred soldiers who have been assigned to the school for technical instruction. The equipment is thoroughly modern in every respect. In spite of the structural peculiarities to be coped with, it is well lighted by two rows of windows in the rear wall and one row in the front wall. Similar quarters have been provided at Allentown, Pa., by inclosing a roofed grandstand.

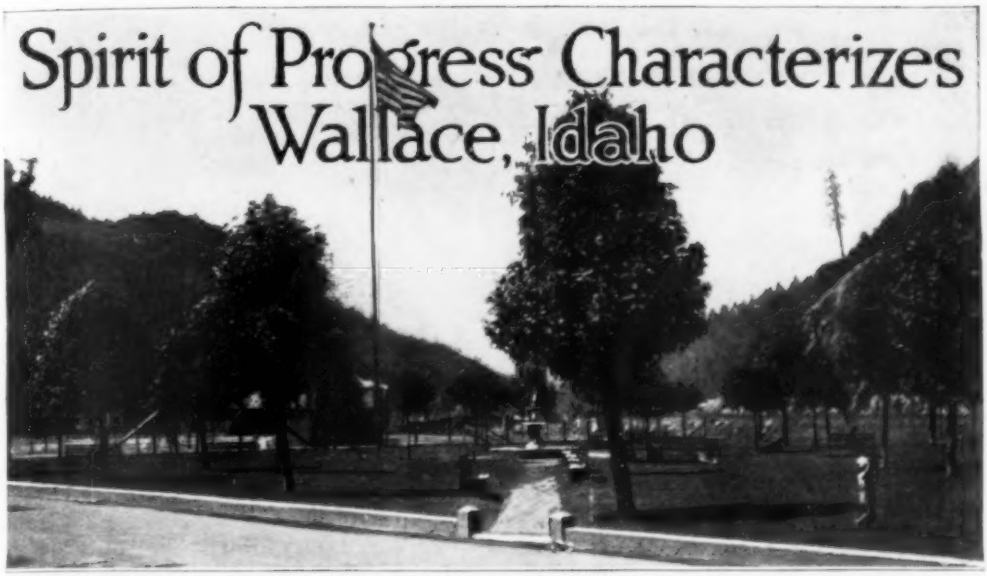


Front View of the Bleachers in Process of being Changed to Barracks: Note the Row of Windows in the Front Wall



The Rear and End Walls under Construction: The Bleachers, at Ames, Iowa, Seat 5,000 People and the Novel Barracks have been Equipped for Several Hundred Soldiers

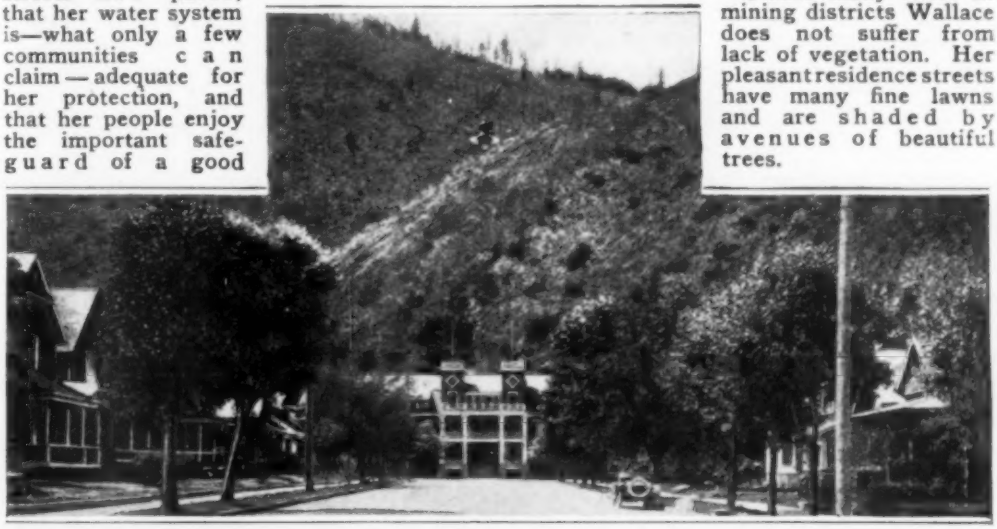
Spirit of Progress Characterizes Wallace, Idaho



The Pretty City Park at Wallace: The Trees in the Park, While Still Young, Are Thrifty. In a Few Years They will Rival the Older Growth on the Surrounding Hillsides

CIVIC pride is the quality which makes it possible for any community, large or small, to lay claim to special distinction. Wallace, Idaho, which was described somewhat inaccurately, we find, in our April magazine, shares this special grace in such measure that she resents being termed "dingy, dirty, and tumbledown," and also denies that her foundations were laid with any other idea than that of permanency. It was raw weather when our traveling editor made this northern trip and perhaps the day he spent in Wallace was particularly dismal. At any rate he failed to note that Wallace's streets are paved; that her water system is—what only a few communities can claim—adequate for her protection, and that her people enjoy the important safeguard of a good sewerage system. Two streams run through the town, and for blocks these are confined between concrete embankments. Wallace's homes are lighted with electricity and are supplied with modern conveniences. The city is the metropolis and supply depot of the Coeur d'Alene district, consequently it has mercantile establishments which, so far as stocks and headquarters are concerned, would be a credit to a much larger city. We published many interesting Wallace views in our April magazine, but cannot refrain from using two others which are particularly noteworthy.

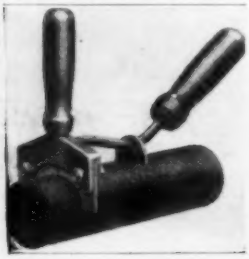
Unlike many cities in mining districts Wallace does not suffer from lack of vegetation. Her pleasant residence streets have many fine lawns and are shaded by avenues of beautiful trees.



One of Wallace's Hospitals: It is Located at One End of Cedar Street, Backed by the Wooded Hills and Facing Rows of Attractive Residences

HANDY TOOL FOR REMOVING COATING FROM PIPES

A handy scraper for cleaning rust, frost, paint, etc., from pipes or round rods is provided with a bronze head in which two curved, beveled blades are pivotally fastened so that they adjust themselves about a pipe, half encircling it. A similar tool, called a pipe cleaner, is equipped with a pneumatic hammer. The light blow delivered by means of the hammer make the cleaner especially suited for removing a brittle coating of any kind, while the scraper is better adapted to removing a gummy substance.



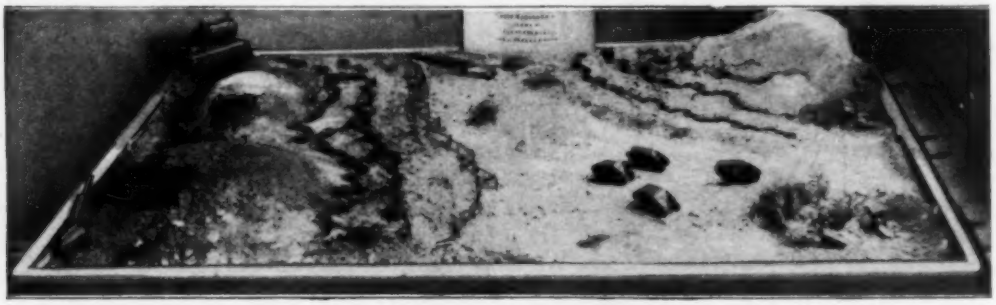
"WORKING MODEL" OF FRENCH BATTLE FIELD

Chemistry students in a Los Angeles high school recently demonstrated their knowledge of explosives as well as of modern warfare by preparing small charges to be set off in an interesting "working model" of a portion of a French battle field, prepared by their instructor for exhibition before a scientific gathering. Trenches, barbed-wire entanglements, No Man's Land pocked with shell holes, and tanks were realistically reproduced, while above hovered a Zeppelin and aeroplanes. At an appointed time an electric button was pressed and the mines laid by the students were exploded. The miniature battle field measured 5 ft. square and reproduced various elevations to scale.

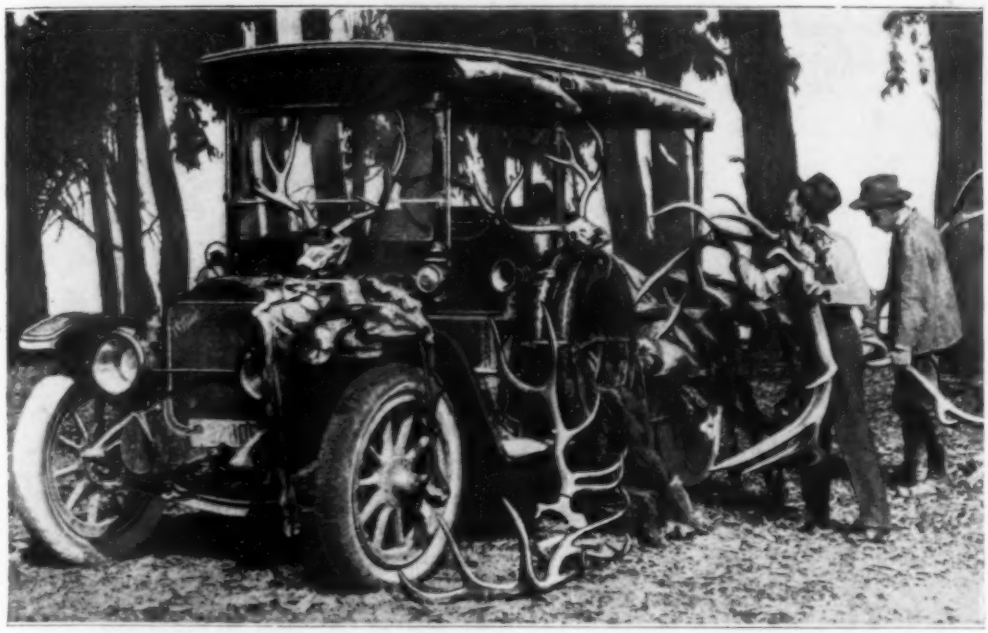
MANY UNIFORMS FOR WOMEN OFFICIALLY RECOGNIZED

How actively American women are participating in the present war is shown by the fact that already the United States officially recognizes 20 different uniforms for women. These include the costumes for women munition workers, telephone and radio operators, yeomen, employes of the Shipping Board and the Food Administration, Red Cross workers, Y. W. C. A. workers abroad, the Woman's Motor Corps of New York, Girl Scouts, and students in the National Service School of the Woman's Naval Service at Washington.

Special interest centers in the uniform of the munition workers — a blouse, an insigne, and especially designed overalls—because it is formal recognition of the importance which the government attaches to these women's tasks. Girls in the telephone unit of the Signal Corps wear navy-blue uniforms with Norfolk-style coats, blue trench cap for service, and felt hats of sailor shape for dress. There are 10 different costumes authorized by the Red Cross with distinctive sleeve bands and insignia to indicate various kinds of work in which the vast army of paid helpers and volunteers are engaged.



A Miniature of a Portion of a French Battle Field, with Opposing Lines of Trenches and Other Striking Features of Modern Warfare Realistically Reproduced



Bringing Home the Trophies of a Big-Game Hunt That Lasted Six Weeks: In That Time the Truck Traveled 2,400 Miles and Many Splendid Specimens were Obtained for a Museum

TAKE BIG-GAME HUNTING TRIP IN MOTOR TRUCK

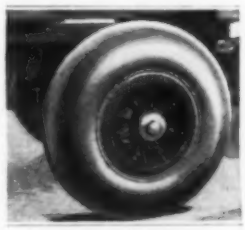
Big-game hunting with the aid of a motor truck was the delightful experience of a sportsman who recently made a western tour of 2,400 miles in search of zoölogical specimens for a museum. The trophies were obtained in Wyoming and included five giant elk and two black bears, besides a number of smaller animals. Special permission had to be obtained from the Wyoming authorities to procure them.

WAR DEPARTMENT CREATES "INVENTIONS SECTION"

The War Department has announced that an "inventions section" has been created which will act as an agency within the general staff and conduct prompt and thorough investigations of all inventions offered to the department. Inventions may be sent by mail or submitted in person, accompanied by letters and drawings. They will first go to an examining board that will decide whether they have merit. In case of favorable consideration the inventions will be referred to the Advisory Board, which will determine by whom tests and development shall be undertaken. All matter submitted will be treated as confidential.

TWELVE-INCH PNEUMATICS NOW MADE FOR TRUCKS

By using laminated cords without cross weave, instead of woven fabric, it has been possible to increase the cross section of pneumatic tires to 12 in. Tires of 9-in. diameter are now in successful commercial use. Apparently the ultimate refinement of these big tires will permit heavy trucks to duplicate the phenomenal growth made by pleasure cars. In addition to increasing the speed and range of powerful trucks they reduce the cost of operation and upkeep.



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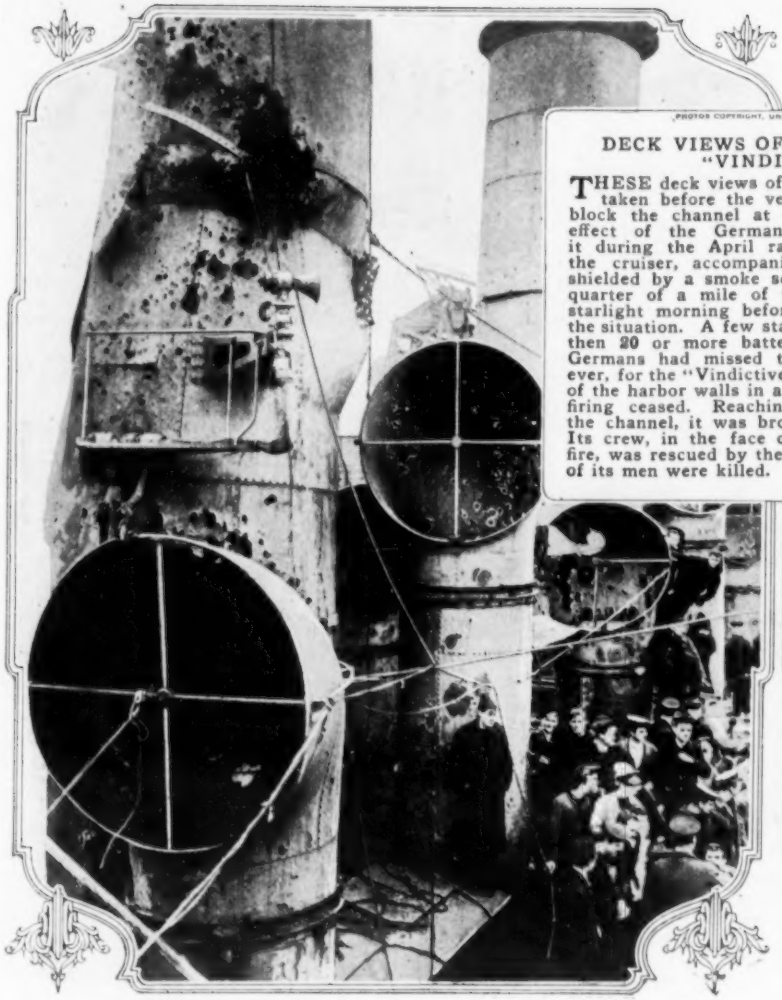
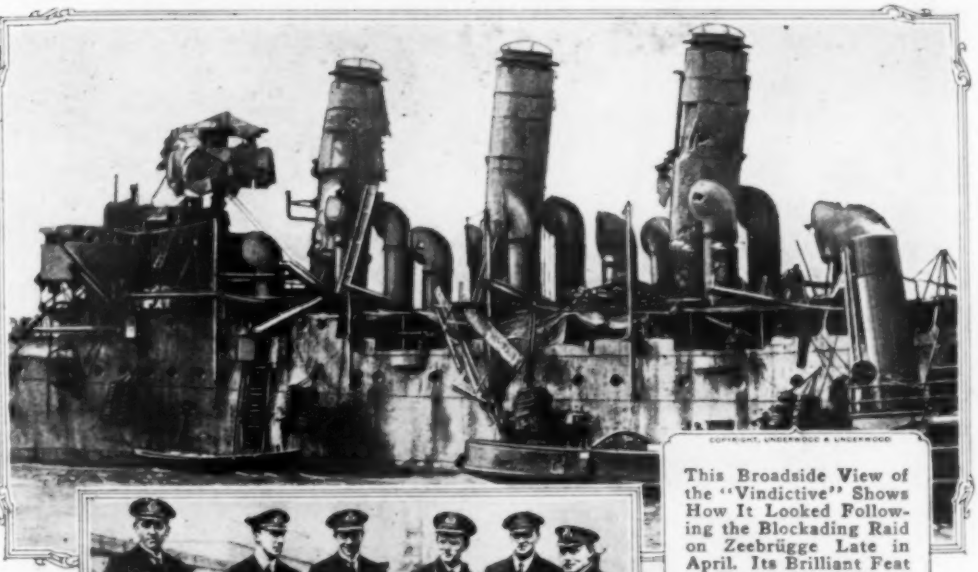
DECK VIEWS OF THE BATTERED "VINDICTIVE"

THESE deck views of the "Vindictive" were taken before the vessel was made ready to block the channel at Ostend, and show the effect of the German fire directed against it during the April raid. In its final task the cruiser, accompanied by destroyers and shielded by a smoke screen, steamed within a quarter of a mile of the harbor gates on a starlight morning before the Huns awoke to the situation. A few star shells were fired and then 20 or more batteries opened up. The Germans had missed their opportunity, however, for the "Vindictive" gained the protection of the harbor walls in a few minutes and heavy firing ceased. Reaching a point 100 yd. up the channel, it was brought around and sunk. Its crew, in the face of terrific machine-gun fire, was rescued by the small boats. Only five of its men were killed.

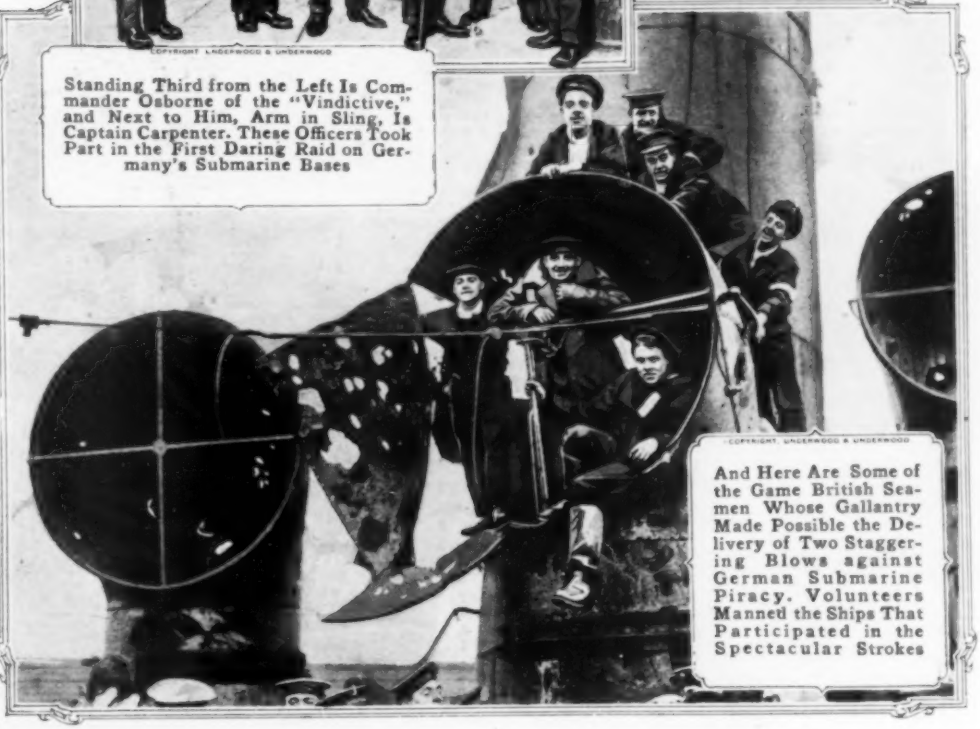


SCARRED "VINDICTIVE" LOCKS OSTEND CHANNEL



This Broadside View of the "Vindictive" Shows How It Looked Following the Blockading Raid on Zeebrügge Late in April. Its Brilliant Feat in Early May When, Filled with Concrete, It Braved the Shore Batteries, Slipped into the Channel at Ostend, and was Sunk and Deserted by Its Crew, Gives It a Permament Place in British Naval Annals

Standing Third from the Left Is Commander Osborne of the "Vindictive," and Next to Him, Arm in Sling, Is Captain Carpenter. These Officers Took Part in the First Daring Raid on Germany's Submarine Bases



And Here Are Some of the Game British Seamen Whose Gallantry Made Possible the Delivery of Two Staggering Blows against German Submarine Piracy. Volunteers Manned the Ships That Participated in the Spectacular Strokes

BRITISH WAR ACTIVITIES SHOWN IN PHOTOS

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French Tanks, Partly Dismantled to Facilitate Their Transportation on the Small Flat Cars Used on European Railways, being Rushed to the Front: The Picture was Probably Taken Shortly before the Outset of the German Drive

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Making an Intimate Map of Enemy Territory by Assembling Small Prints Provided by British Aerial Photographers: Map Making of This Kind Saves Much Time and Is of Great Value

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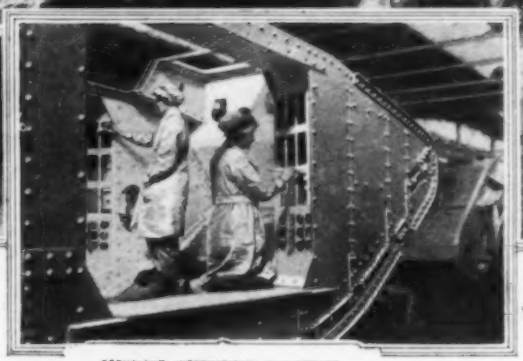
Heavy Long-Range Guns Guard the Coasts of the British Isles against Desultory Bombardments and Possible Attempts at Invasion. Although a Few German Vessels have Shelled Unprotected British Points during the War, Attacks at Fortified Places Such as This have Not been Reported

TAKEN AT HOME AND IN THE FIGHTING ZONE

Road Building Is Constantly in Progress at the Front and in the Great Territory at the Rear as Battle Lines are Shifted. These Operations are Carried Out on a More Enterprising Scale than One might Suppose at First Thought, as is Attested by the Deep Cut being Made by Britishers Shown at Work in the Photograph Above



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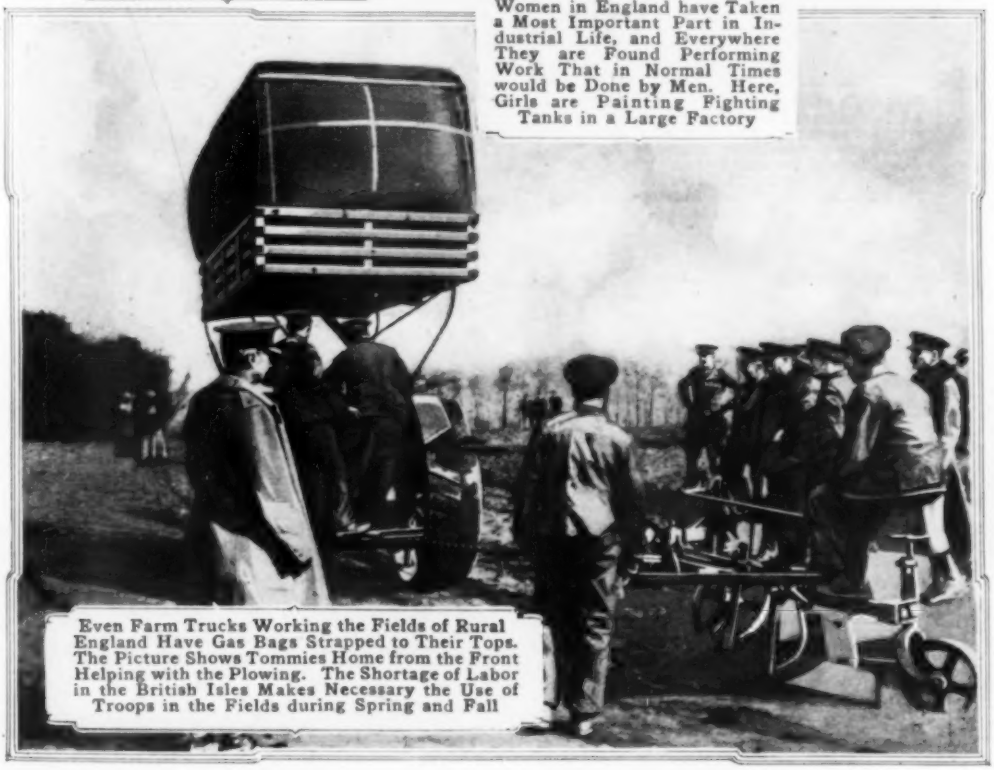
Women in England have Taken a Most Important Part in Industrial Life, and Everywhere They are Found Performing Work That in Normal Times would be Done by Men. Here, Girls are Painting Fighting Tanks in a Large Factory



Even Farm Trucks Working the Fields of Rural England Have Gas Bags Strapped to Their Tops. The Picture Shows Tommies Home from the Front Helping with the Plowing. The Shortage of Labor in the British Isles Makes Necessary the Use of Troops in the Fields during Spring and Fall

EFFECT OF GERMAN WARFARE ON CIVILIANS

Serbian Supply Depot behind the Lines on the Macedonian Front, Showing the Wretched Conditions with Which the Gallant Little Army of King Peter Contend: Here the Clothing of Fallen Fighters is Sorted, Fumigated, Cleaned, and Redistributed. Necessity Makes This Depot a Junk Yard of Battle-Field Ragpickers

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Although Maintaining Outward Calm, Parisians were Much Concerned by the Bombardment of the French Capital, and during the First Days of April Thousands of Persons Deserted the City for Places of Greater Safety. Here Two Men are Moving Their Belongings in a Pushcart

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Peasants in the Villages of Picardy Were Loath to Leave Their Homes When the Huns Began the Spring Drive for the Channel Ports. This Pictures Some of the Poor People being Assisted from a Village by Poilus at the Last Minute. Such Photographs Portray the Indomitable Spirit of the French

IN LONDON, PARIS, AND FRENCH PROVINCES

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American Army Officers within the Ruined Church of St. Gervais at Paris, after the Long-Range Bombardment of the City by the Huns on Good Friday: Some 75 Worshipers were Killed and Many More Injured While Attending Services Here. Although It might with Correctness be Said That When Firing from a Distance of 75 Miles the Germans could Not Intentionally Shell a Church, It must be Admitted That at Any Range They Seldom Miss a Church or a Hospital

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Despite the Seriousness of the Business of Dodging Bombs in London Streets, One cannot Help Finding Humor in This Picture, Which Shows Army Helmets on Sale in a Small Shop. The Placard Reads: "Steel Helmets for Civilian Use—A Protection against Shrapnel"

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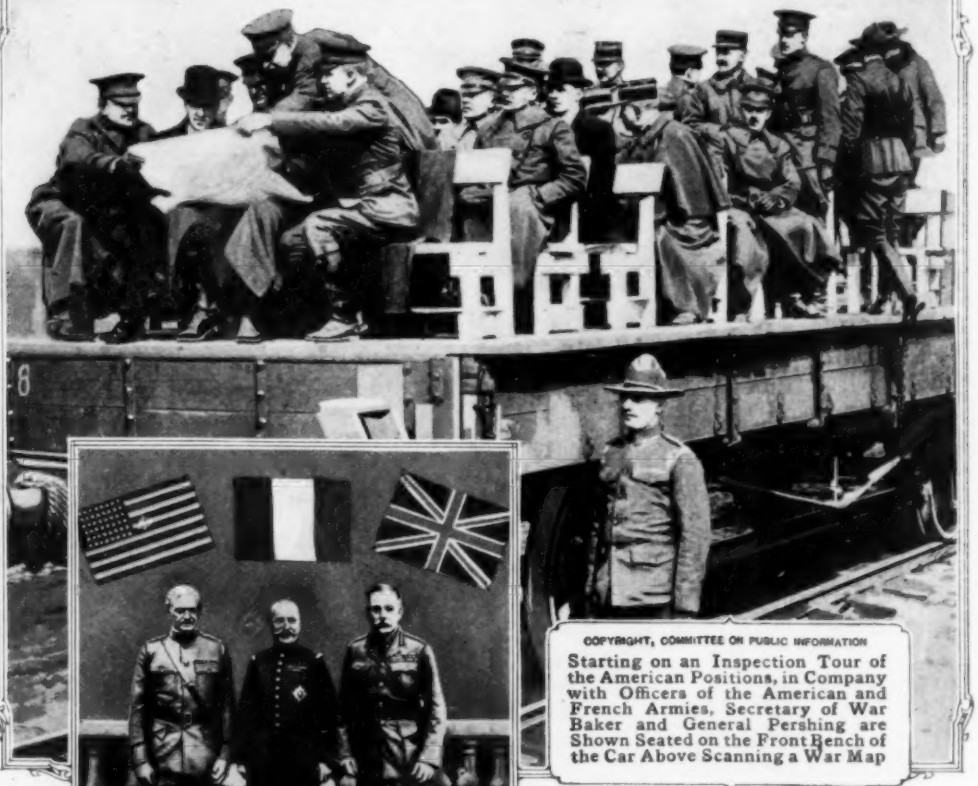
Paris Movie Houses Vie in Advertising the Protection They Offer Patrons in the Event of an Air Raid. This One Announces Its Six Stories of Vaulted and Electric-Lighted Underground Caves

Peasant Women Cultivating the Soil amid Wire Entanglements of an Abandoned Battle Field in a District Where the Germans have been Driven Back

SOME AMERICAN WAR VIEWS FROM FRANCE



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Starting on an Inspection Tour of the American Positions, in Company with Officers of the American and French Armies, Secretary of War Baker and General Pershing are Shown Seated on the Front Bench of the Car Above Scanning a War Map

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Standing beneath the Flags of Their Respective Countries, Three of the Military Leaders with Whom Democracy's Safety is Intrusted: Pershing, Foch, and Haig

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Showing the Wreckage of Two German Planes, Felled April 14 by Lieutenants A. S. Winslow, Chicago, and Douglas Campbell, Mount Hamilton, California: As an Interesting Side Light, Young Winslow on His First Flight at the Front Chased a Hun, Who had Attacked an Observation Balloon, All the Way to the Rhine

FRENCH AND BRITISH ON PICARDY FRONT

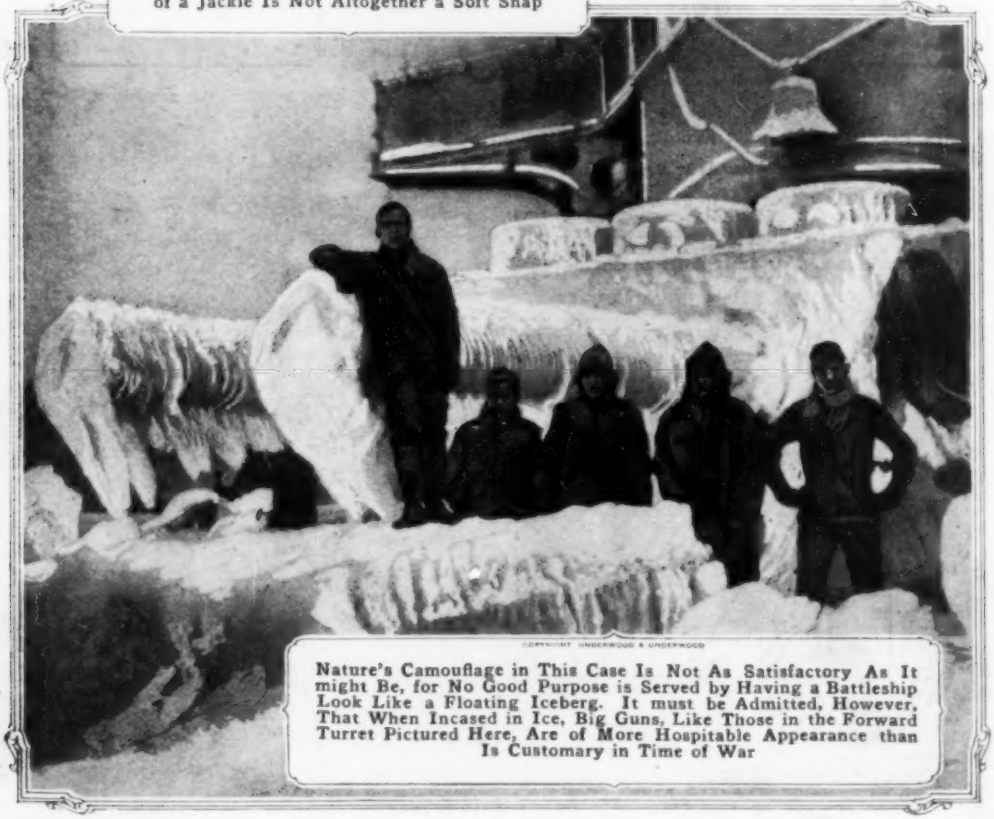
Battery of French "75s" in an Open Field Some Distance Back of the Lines: The Picture was Taken Several Weeks Ago When the German Offensive Was at Its Fever Heat and French Reserves were Thrown into the Battle to Help the British Hold Out at Crucial Points. TheArtillerymen are Here Shown Establishing a New Position

Open Fighting Attends a Drive That Continues Day after Day. When Things were Their Hottest in Picardy There Was No Time for Elaborate Trench Systems and Underground Works to be Established. Trenches Were Little More than Furrows at Some Points

Here a Group of Tommies is Shown Enjoying a Welcome Rest in a Village Street during a Lull in the Battle. The Fiercest Kind of Hand-to-Hand Fighting Marked Much of the Struggle along the Somme When Towns were Gained and Lost and Regained Often in the Course of a Single Day

FROZEN SPRAY MAKES ICEBERGS OF OUR WARSHIPS

Bow View of One of Our Big Battleships Blanketed in a Heavy Mantle of Ice: With Crowbars and Shovels, Members of the Crew are Clearing the Deck and Making It Less Arctic in Appearance. This Picture, Taken in Mid-Ocean After the Ship had Encountered Heavy Weather, Shows That, After All, the Life of a Jackie Is Not Altogether a Soft Snap



Nature's Camouflage in This Case Is Not As Satisfactory As It might Be, for No Good Purpose is Served by Having a Battleship Look Like a Floating Iceberg. It must be Admitted, However, That When Incased in Ice, Big Guns, Like Those in the Forward Turret Pictured Here, Are of More Hospitable Appearance than Is Customary in Time of War

"ANZACS" AND "BLUE DEVILS" INVADE NEW YORK

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"Anzacs" Parading in Fifth Avenue between Throngs of New Yorkers during the Recent Liberty Loan Drive: These Fighters, Members of the Australian and New Zealand Army Corps from Which Their Name is Derived, Visited Gotham on Their Way to France and Took a Few Preliminary Wallops at the Kaiser by Boosting Victory Securities

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France's "Blue Devils" are So Named by the Hun for the Reason That They Not Only Look, but Also Act, the Part When a Little Work Is in Hand That Calls for the Use of Cold Steel. Here, with Some of Pershing's Fellows Who have Smelled Powder, They are Shown at the City Hall in New York being Welcomed by Mayor Hylan. Like the "Anzacs," They Helped Sell Bonds

YANKEE CAMOUFLAGE ARTISTS IN THE MAKING

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Here a Camouflage Class in Training is Doing on a Small Scale Work That Later will be Done in Dead Earnest. To Conceal Roads, Artillery Batteries, Observation Posts, and Machine-Gun Positions Quickly and Cleverly has Become One of the Fine Arts in Modern Warfare, and to These Young Fellows of Ingenuity Fall Such Tasks

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No One Cares to Be Conspicuous When on Duty at the Front, Much Less a Listener in "No Man's Land," or a Lookout Who Happens to Be in Range of German Snipers. This Shows an Instructor in Camouflage Demonstrating to His Class a Bit of Pigment Necromancy

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This Photograph Is the Sequel of the One Presented Immediately Above. In the Midst of the Rocks a Soldier Is in Plain View. Because of the Close Range at Which the Picture was Taken It Is Not Difficult to Distinguish Him. But at a Few Hundred Yards He would Be Safe from Detection So Long as He Remained Immovable

ALUM IS USED IN REMOVING GERMS FROM WATER

By using filter alum in rapid sand filters, good results are being obtained in reducing the bacterial content of the well water at American mobilization camps in France. The chemical coagulates on the sand at the top and forms a film to which the bacteria adhere as the unpurified water trickles through the bed. At regular intervals the upper surface of the sand is replaced and a fresh supply of alum introduced.

INVENTION PROTECTS RADIO WHEN SHIP IS TORPEDOED

When a ship is torpedoed the radio antenna is frequently snapped by the springing of the masts. This cuts off the vessel's only means of communication and prevents it from calling for help. To overcome the condition an inventor has developed a new system of suspending aerials. Coil springs are interposed between the opposite ends of the antenna and its masts so that in case the latter are sprung the

In Case the Masts are Sprung So That They Lean Away from Each Other at a Wide Angle, the Springs Meet the Emergency and Prevent the Aerial from Breaking

aerial is automatically lengthened, even as much as 100 ft. if needs be, instead of being broken.

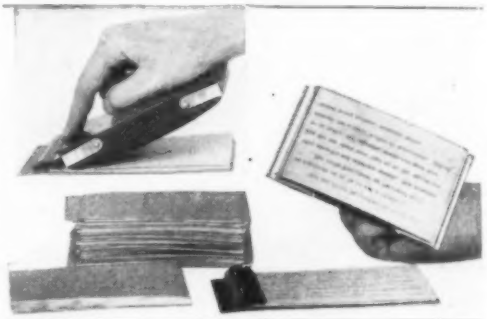
TRAVELING POST OFFICE ON INDUSTRIAL TRUCK

An electric industrial truck, which is equipped as a traveling post office and manned by a clerk and driver, is the very up-to-date means used in a large manufacturing plant for distributing and collecting the mail. Mounted on the truck are a distributing table and cases containing compartments for letters and parcels. The clerk distributes the mail into the proper pigeonholes as the outfit proceeds on its way. Six trips through the plant are made daily, resulting in an estimated saving of 50 per cent in time and labor, as compared with the service given by messengers or pneumatic tubes.

No Time is Lost in Handling This Factory's Mail. This Traveling Post Office Collects and Distributes the Letters throughout the Big Plant Six Times Daily

SIMPLE DUPLICATOR MAKES COPIES POST-CARD SIZE

A handy outfit for duplicating copy on post cards, etc., consists of a block with one curved surface to which is attached a gelatin sheet or a waxed-paper stencil after the desired copy has been transferred to it. The cards to be printed are placed on a flat support having a groove at one end that serves as a guide in placing the block in a printing position. About 1,000 copies can be made with the stencil, if ample ink is spread on the block, and 100 copies with the gelatin.



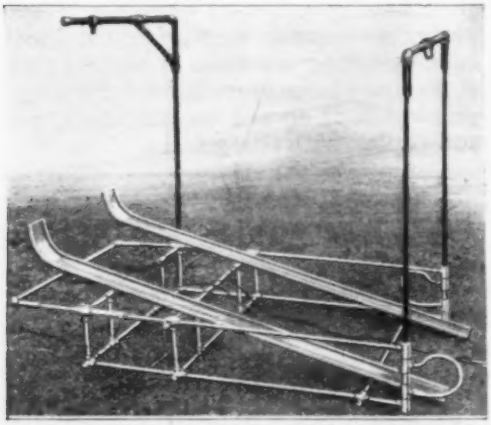
The Duplicator is Held in the Hand as Shown. When a Stencil is Attached to the Curved Surface, 1,000 Copies can be Made; with a Gelatin Sheet, 100 Copies

PHOTO BY COURTESY OF

What a Throng of 300,000 People Looks Like: This Extraordinary Demonstration was Held in Forest Park, Were Indicative of the Final Result of the Drive, in Which the City

CRANE-EQUIPPED WORKING CRADLE FOR GARAGE

To facilitate the repairing and overhauling of motor cars in public garages, a novel "dry dock" has been developed. The apparatus is a working cradle equipped with cranes. A balanced track enables a car to be run onto the frame and supported several feet above the floor so that repairs may be made beneath it without the usual difficulty. The hoisting equipment is manually operated and so arranged that the whole car, its body, or engine may be lifted with ease.



When a Car is Run onto It, the Track Assumes a Horizontal Position and is Locked Against Movement. The Picture Shows a Small Model of the Apparatus

BREAK OCCURS IN WALL OF BIG DIRT DAM

A serious break which occurred in the Calaveras dam 36 miles southeast of San Francisco a few weeks ago has centered attention on distinctive features of this big water project which have been the subject of keen controversy. The dam, which creates a vast reservoir, is built in the form of a trough across a gorge. The two sides of the trough are made up in part of dry clay and gravel, the upstream wall being faced with concrete. Up to the time of the accident the walls had been raised to a height of 190 ft. If they are raised 50 ft. more, as originally proposed, this will be the highest dam of its particular kind in the world, it is said.

The area between the two walls of the trough was filled by a hydraulic process with mud, gravel, and crushed rock. The break occurred when the upstream side of the trough gave way under pressure of the mud and rock accumulated in the trough, washing 800,000 cu. yd. of dirt and a gate tower into the reservoir. Apparently this center filling had not solidified as it should. Had the second wall given way also, serious disaster would have resulted.

THE ST. LOUIS POST-DISPATCH

St. Louis, during the Third Liberty Loan Campaign. The Enthusiasm Shown and the Number Present Far Exceeded Its Quota, Just as It Had in All Previous Drives

HUNDREDS OF THOUSANDS IN GREAT LOAN RALLY

Eager to give expression to their patriotism, and proud of the remarkable showing which their city had made in previous war "drives," the people of St. Louis turned out by the hundreds of thousands to a Third Liberty Loan demonstration a few weeks ago. Assembled on the sloping hillsides which form a vast amphitheater about a grandstand in Forest Park was a throng estimated at over 300,000 persons, or nearly one-half as many individuals as live in that city. Many present declared it the most impressive spectacle they had ever witnessed.

DESCENDING AEROPLANE CAUGHT IN WIRES

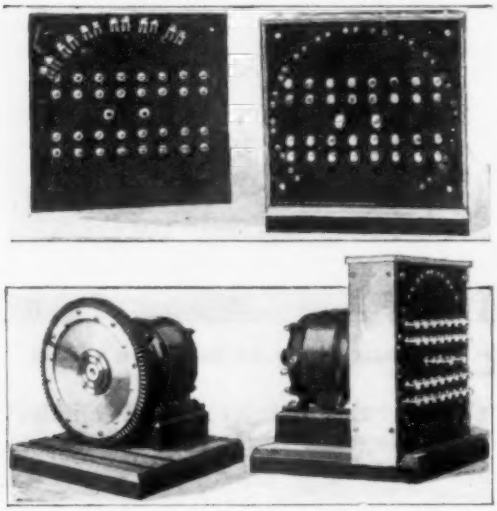
A recent evening exhibition by a Canadian flier had an unusual and almost tragic ending when the airman attempted to alight in the street of the town whose population he had been entertaining. Due to some miscalculation, his machine caught in the electric-light wires, one end of his plane striking a near-by roof. Dislocation of the wires plunged the entire town and a neighboring city into darkness. The airman was uninjured and climbed along his plane to the roof and then to the ground.

Aeroplane Precariously Suspended by Electric Wires in Which It was Caught on Account of Miscalculation in Alighting: The Accident Plunged Two Towns into Darkness

¶Congressional approval is being sought for a special flag for women who are giving their whole time to war work. It is white with a colonial blue border and has a red star for a woman serving abroad and a blue star for a woman serving in this country.

RADIO-SIGNAL GENERATOR FOR TRAINING OPERATORS

In training wireless operators for the army and navy, a radio-signal generator is coming to be used. It is a high-frequency apparatus that replaces a buzzer and gives, for practice purposes, signals similar to those transmitted by undamped-wave generators and quenched-spark sets. It has 98 poles and a rotor, which is the field, and is driven at a speed sufficient to give a clear musical note. The receivers are connected directly with the stator coils through the transmitting keys.



Showing Different Views of the Radio-Signal Generator Used for Practice Purposes in Training Wireless Operators for the Army and Navy

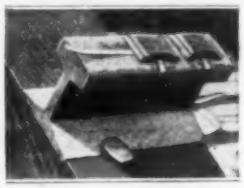
UNDER-CAR CREEPER BUILT LIKE BED SPRING

As an aid to the comfort of a repairman at work beneath a motor car, a creeper has been built after the style of a bed spring. A metal frame mounted on ball-bearing casters is supplied with a link-fabric spring and cotton-filled pillow. Also there is a brake that holds the creeper against movement at times when steadiness is desired. At the foot of the frame there is a trough in which small parts may be deposited.

With This Creeper of All-Metal Construction, a Repairman Rests on a Comfortable Link-Fabric Spring

IMPROVED TORPEDO FOR RAILWAYS

Because the railway torpedoes formerly used occasionally slid from the rail, particularly on grades, and so failed to give the necessary signal, the Southern Pacific Company has adopted an improved torpedo. The new feature is a thin metal strip extending from one side of the loaded cap. This is laid lengthwise on the rail, toward the approaching train. The wheels strike the strip first and so hold the cap in place until it is exploded.



CREPE-PAPER BANDAGES IN PLACE OF GAUZE

Crêpe-paper bandages are now being used as a substitute for gauze, of which there is a scarcity. The government and various large hospitals are said to have found the new product satisfactory, particularly for outside wrappings. It has been estimated that in more than 50 per cent of the cases it can take the place of gauze. The paper is tough and at the same time, being of the crêpe variety, has an elastic quality which is advantageous in wrapping wounded parts.

ESTABLISHING A TOURIST CAMP AT THE FOOT OF THE GLACIERS

By STANLEY W. TODD

EXCEPT during a little more than a month in midsummer, Paradise Valley in Mount Rainier National Park, State of Washington, is hidden in snow. Situated at the very base of Mount Rainier, itself perpetually covered with glacial ice and snow, this region would be inaccessible to the ordinary traveler, were it not for Uncle Sam's marvelous achievements in road building. Even in August, the valley is dotted with snowfields and the foothills are hardly uncovered before fall and winter flurries cover them up again.

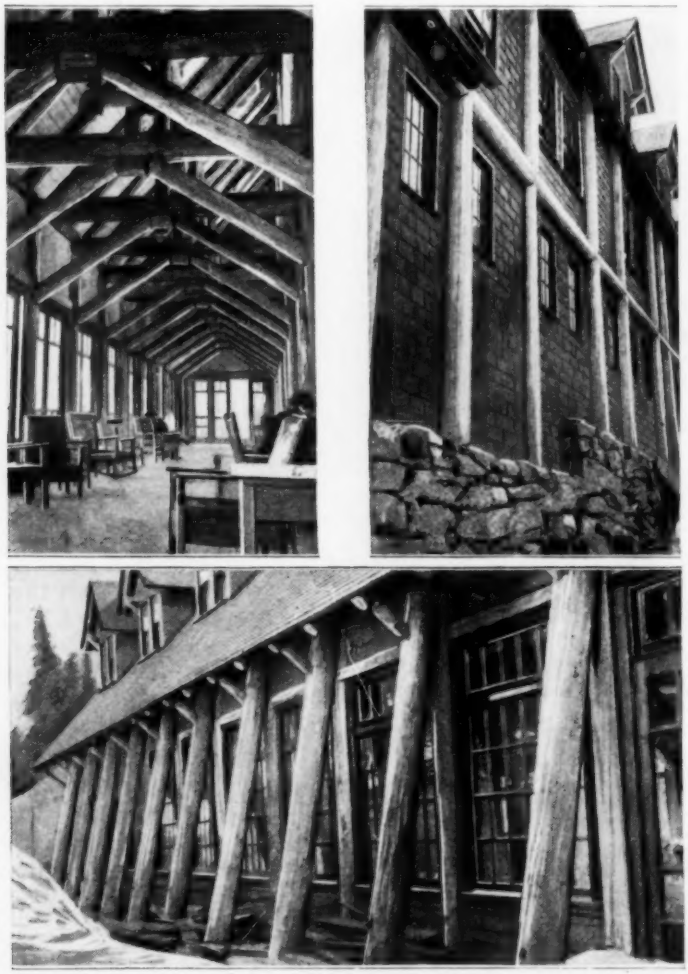
After Passing through the Gateway Built of Heavy Logs, at the Park Entrance, the Motorist Enters a Region of Remarkable Scenic Splendor

To utilize this very brief "open" season and give tourists a close view of the wonderful peak, the U. S. Department of the Interior has pursued a progressive policy in developing the roads and accommodations in the park, and in calling the attention of the people to its beauties, by means of government bulletins. As a consequence, more people than ever before were able not only to motor up to the foothills of Mount Rainier last summer, but to find hotel accommodations there, in a unique log-cabin inn, that had been built in one season amid untold difficulties. It was not until August that the snows had melted sufficiently to make the automobile road, cut out of solid rock and curling around the sides of the mountains, safe enough for use.

Even then, the greatest precaution had to be exercised in controlling the movement of motor cars over the last ten miles of the road to Paradise Valley. Not being wide enough to permit the passage of automobiles with any degree of safety, particularly at points

Because of the Difficulty in Transporting Materials, and the Briefness of the "Open" Season When Work could be Done, the Erection of the Inn Was Not a Simple Task. The Structure Accommodates 400 Guests

where there is a sheer slope of 2,000 feet, motorists were permitted to move in only one direction at a time. At Nisqually Glacier, a point ten miles below Paradise Valley by road and a mile and a half by trail, a park ranger was stationed. On the half-hour intervals, after a stream of cars from the valley, the last carrying a little signal flag, had passed through, he opened a road gate, permitting a procession of waiting motorists to go up to the mountain. In this way, no automobiles passed each other, and although 10,000 people visited the valley in this way, no accident of any kind was recorded.



During the Wintertime the Inn is Practically Buried under Snow. Special Provisions Therefore had to be Made So That It could Withstand the Great Load Imposed on It Many Months of the Year. The Pictures Above, Giving Interior and Exterior Views of the Building, Show How This Reinforcement was Provided

At what is known as the Nisqually River entrance, which is in the southwestern corner of Mount Rainier Park, every visitor is required to register in the government office and motorists must also purchase automobile permits.

This entrance is six miles from the railroad station at Ashford, Wash., which is itself 50 miles from Tacoma and 90 miles from Seattle. The first principal stop on the way to Paradise Valley is at Longmire Springs, six and a half miles beyond. Having left the park entrance, which is marked by a gateway made of timber, the motorist passes through a section of marked scenic interest.

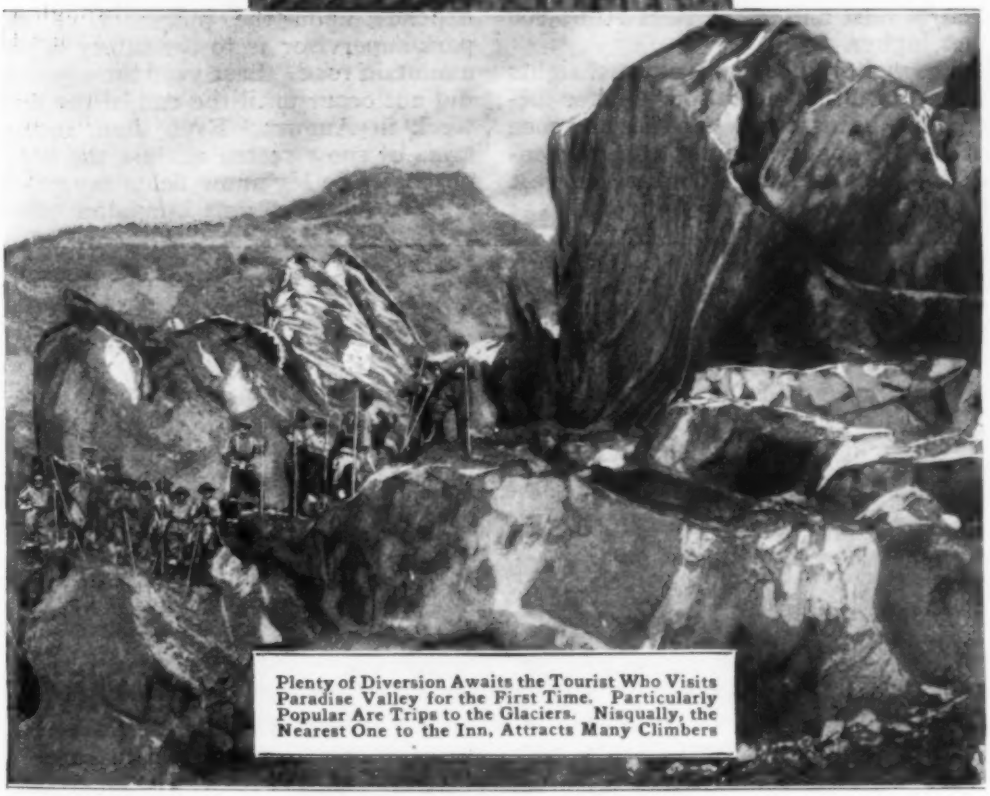
Longmire Springs, for many years the farthest stop up the mountain, is now largely a way station. A new mountain inn was erected this year, giving added facilities to the private company owning the park concessions for the accommodation of summer tourists. Besides a public camp ground, used largely by motorists carrying their tents and utensils in their machines, Longmire Springs is the location of the park supervisor's office, a log cabin, and is notable for the several natural springs that abound. Here the traveler can regale himself with a taste of the water from bubbling iron, sulphur, or soda springs, the last being by far the most popular.

So colossal are the proportions of

Mount Rainier, which is without question the most wonderful mountain in the United States, that it covers one-third of the entire national park, 18 miles square. In other words, the mountain, in reality a dead volcano, stands, in round numbers, 10,000 feet above its immediate base, is nearly three miles high, measured from sea level, and covers 100 square miles of territory. The empty crater of this glacial oc-

The Reward for the Hard Climb to Rickseckers Point Is a Magnificent View of Snow-Burdened Mount Rainier

topus is 14,408 feet high, second only to Mount Whitney, the highest in the country. The road from Longmire Springs to Paradise Valley is undoubtedly the most interesting of all. Within a thousand feet of the bridge over the ice-cold, sandy-colored Nisqually River, where the park ranger enforces the "Indian file" movement of automobiles, there stands the massive mouth of the glacier itself. This



Plenty of Diversion Awaits the Tourist Who Visits Paradise Valley for the First Time. Particularly Popular Are Trips to the Glaciers. Nisqually, the Nearest One to the Inn, Attracts Many Climbers

mountain of ice is said to advance 16 inches a day, and the river gushes forth from underneath it in mysterious fashion.

The upper eight miles of the road has an average grade of only four per cent and is perhaps one of the most wonderful automobile drives in the world. By means of "step-ladder" curves and wide sweeps—and in one place eight parts of the same road can be seen, one above the other—the motorist is brought to new positions of vantage, like Ricksecker's Point, where another remarkable view of Mount Rainier can be obtained. The last section of the road cuts a complete semicircle at the base of the Tatoosh Range and around the valley to the plateau, where the inn and its surrounding tent city are reached. Between the base of the Nisqually Glacier and the valley, there is a rise of about 1,500 feet. The valley is 5,557 feet in elevation while the glacial monster just above it, sometimes hidden in mist and snow, rises still 9,000 feet higher.

The visitor finds many unusual sights to capture his attention. After becoming accustomed to the presence of snow fields in summer time, he generally finds much of distinct interest in the novel log-cabin hotel and the myriad of adjacent canvas bungalows which have all been erected during the past year.

The inn, which has accommodations for 400 guests, is of unusual construction. The frame is made entirely of weathered logs from the Silver Forest near by—in other words, burnt timber which is impervious to weather. These logs show entirely to the ridgepole in the big lounging room, which is 50 by 112 feet, while the dining room is practically of the same size. The heavy timber reinforcement both inside and out is to enable the building to withstand the tremendous weight of the snowdrifts in winter, which almost completely hide it from view.

The difficulties attending the erection of the inn at this high point were many, due to the trouble in transporting materials and the extremely short season in which it was possible to do the work. Yet it was erected in a year at a cost of $150,000.

The length of the tourist season depends upon the judgment of the park supervisor as to the safety of the mountain road. Last year the opening did not occur until the end of the first week in August. Even then, mountains of snow rested against the hotel porch, while big snow fields separated it from the numerous bungalow tents

Five Hundred Motor Cars Laden with Sunday Vacationists Swarmed into Paradise Valley the First Week-End. The Inn was Overtaxed and Fully a Thousand Men and Women Slept in Tents Pitched in the Snow

If a Woman, a Glance at the Insert will Explain the Type of Apparel You will Need for Snow Romping in Rainier National Park. No One Dresses for Show

As Late as August the Valley is Spotted with Patches of White, and the Foothills Scarcely are Uncovered before Fall Flurries Again Blanket Them with Snow

in the vicinity. The latter, incidentally, were electric-lighted and provided with board floors, being put up by four workmen at the rate of four a day. At the end of the season, these tents and floors were all removed, lest the winter avalanches destroy them.

The growing popularity of Paradise Valley among people in the Northwest is seen in the fact that over the first week-end at least 500 automobiles congregated there and taxed the old inn to its capacity. A tent city, in which the tents *were* tents and nothing more, was established on a neighboring hill to accommodate the overflow. That one night one thousand persons slept amid snow fields, at least 60 miles from "civilization." All of the current used to operate the plant was produced by a power house harnessed to a glacial waterfall up in the mountains. Hundreds of automobiles were parked out in the open.

The motorists, governed by the ranger's signal system, were permitted to leave only on the even hours in daylight, and at times the procession going back extended for two miles, the road being in sight of the hotel all that distance. Night travel, on account of the dangerous road, was not countenanced by the park authorities. It is the intention of the Government ultimately to extend this road so that it completely encircles the foothills of Mount Rainier, or Mount Tacoma, as the people in the neighboring city of the same name insist on calling it.

One of the chief diversions in the valley is naturally mountain climbing. But it becomes more than that, for the snow fields are more abundant than open ground. At any rate, trips to the glaciers, especially Nisqually, the nearest, are always popular. Many of these are somewhat hazardous, and the parties seldom fail to provide themselves for the rigors of such a strenuous journey.

Mountain-climbing costumes, calks, alpenstocks, sun glasses, and face paint —and a guide—are the first essentials, and as the women are hardly distinguishable from the men, no one

ever dresses for appearances. The most ambitious journey is, of course, that up to the crest of the mountain.

This requires that the hardy climbers leave the previous afternoon and spend all night up in the glaciers.

Bridges are Built Strongly to Withstand the Heavy Load of Winter Snow and the Torrent That Accompanies the Summer Thaw

They usually strive to reach Muir's Cabin, 10,000 feet up, so that they may negotiate the most difficult glaciers where the walking becomes particularly dangerous after the sun starts to soften the ice and snow. Hidden crevices and open ice fields seldom fail to provide sufficient thrills to satisfy the most adventurous, and the novice who attempts such a trip takes several days to recover. For most of the people, the near-by glaciers that can be reached in a day and permit a return before the sun sets are entirely sufficient. Besides, the snow fields in the neighboring hills permit the use of toboggans and skis, which are distinctly novel when used in the summer's sun. The wild flowers above the snow fields are especially alluring.

The development of Paradise Valley is in line with the Government's efforts to encourage tourist travel in this country. "See America First" is more than merely a railroad slogan, for the Department of the Interior has been calling attention to the scenic beauties of our national parks and at the same time providing accommodations for all who would follow its advice. Uncle Sam has undertaken a great work in road building, topographic surveying, and forest fire and other regulations in these national playgrounds, and the results, as in the case of Mount Rainier Park, speak for themselves.

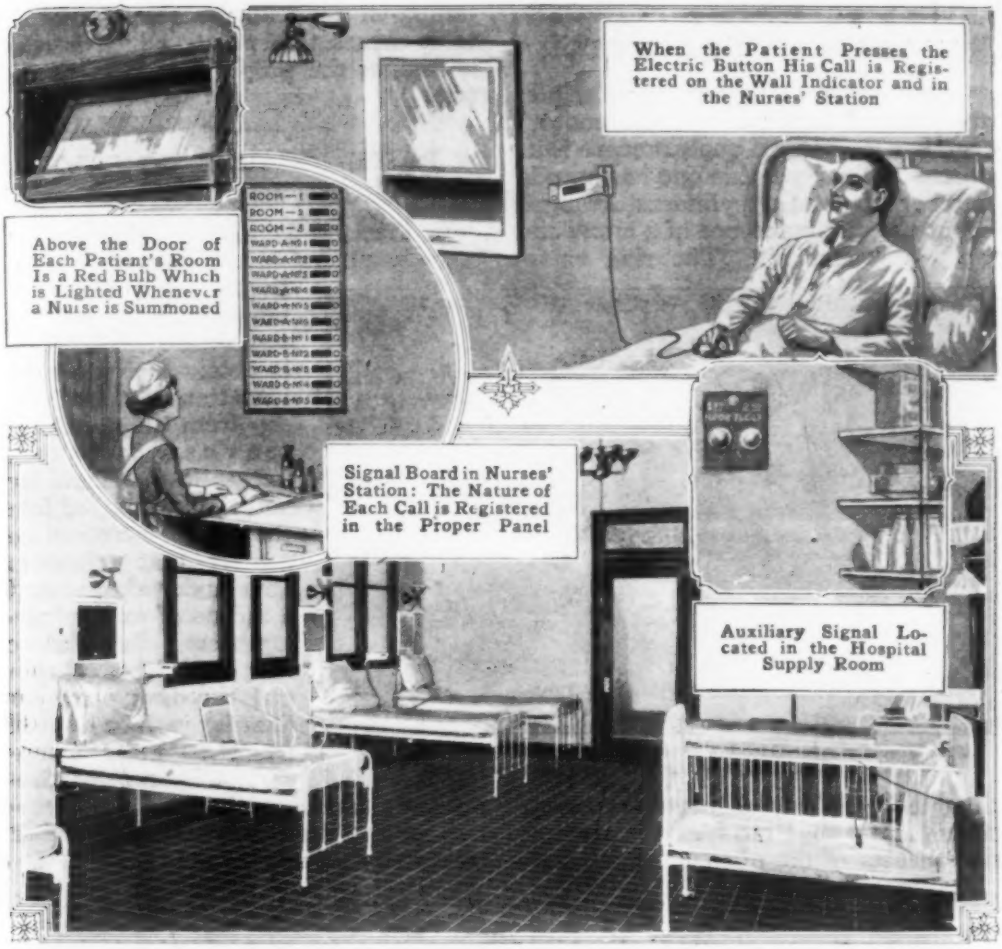
KEYS SHOW DEVELOPMENT OF LOCKSMITH'S CRAFT

Three types of keys, illustrating steps in the development of the locksmith's art, are shown herewith. The middle key represents an improvement on the right-hand one in that toothed leaves of various lengths are inserted in the key frame to form the desired series of notches. An unusual variation of this is the key with wheels of various sizes arranged in such a way that they will lift the tumblers in a certain lock. Following these improvements came the development of the modern lock in which changes in a combination are made by rearranging disks on the lock spindle.

The Two Left-Hand Keys Are Novel Variations of the Old-Fashioned Key Shown at the Right, Interchangeable Leaves being Used in One Case, and Disks in the Other, to Form the Notches

HOSPITAL SIGNAL SYSTEM SHOWS PATIENTS' WANTS

Better service for hospital patients and a saving of many steps for nurses are advantages provided for in a new electrical signal system for hospitals. The system can be installed with little difficulty in an old hospital, if desired, and is entirely suited for use in field hospitals. Beside each bed is a


When the Patient Presses the Electric Button His Call is Registered on the Wall Indicator and in the Nurses' Station
Above the Door of Each Patient's Room Is a Red Bulb Which is Lighted Whenever a Nurse is Summoned
Signal Board in Nurses' Station: The Nature of Each Call is Registered in the Proper Panel
Auxiliary Signal Located in the Hospital Supply Room

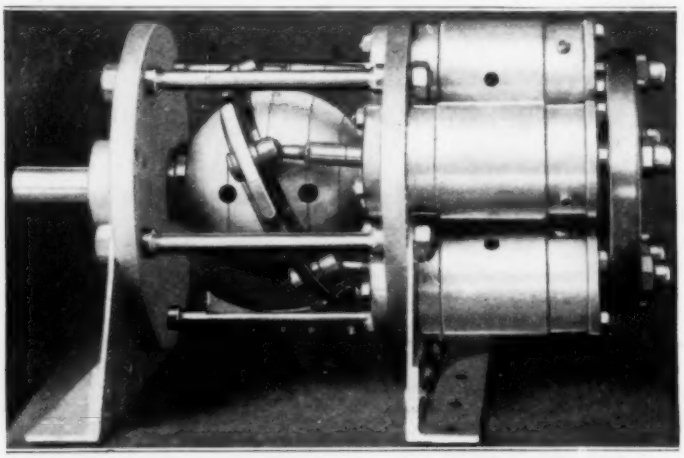
Each Bed of This Ward is Provided with a Push Button and a Duplicate Indicator. The Latter Projects from the Wall and Shows How a Call is Recorded at the Nurses' Station

push button and a small boxlike indicator supported on a bracket extending from the wall. Installed in the nurses' station is a signal board divided into panels, one for each patient's bed.

Pressing the button causes the indicator at the bedside and a corresponding indicator in the nurses' station to register one of four or five wants such as "water," "nurse," etc., according to the number of times the button is pressed. The attendant can respond to the patient's call immediately, no preliminary trip of inquiry being necessary. At the same time that the signal is given a red bulb is lighted above the door of the patient's room, if he is located in a private room, or above his bed if in a ward. By turning a switch a buzzer can be brought into use and each call registered on a board in the office of the nurses' superintendent. When the wants of the patient have been attended to all lights connected with the signal can be turned off by the nurse, and the indicator reset, by pressing a button at the bedside. Besides saving time, the system prevents any dispute between patient and nurse as to the signal given. In case several calls come in at the same time this apparatus enables the nurse on duty to give preference to the patient whose need is most urgent.

STEEL BALL FILLS PURPOSE OF CRANKSHAFT IN MOTOR

Well-known mechanical principles are utilized in another "ball motor" that has put in an appearance. Like others of the type, this one has an odd number of parallel cylinders arranged about the circumference of a circle and lacks a crankshaft. The ring encircling the ball is to all purposes an inclined plane that receives the successive thrusts of the pistons. The oscillating, or wobbling, motion imparted to it causes the sphere, which is connected to the propulsion shaft, to rotate.



This Five-Cylinder Gasoline Motor Represents One More Attempt at the Elimination of the Conventional Crankshaft

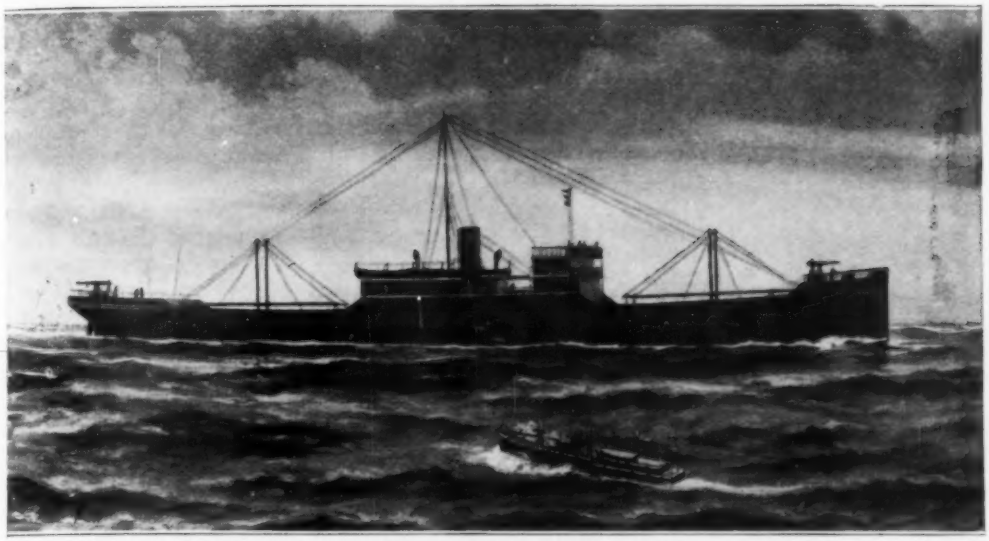
RAISE LIZARDS TO SAVE SUGAR IN TRINIDAD

In Trinidad lizards are being used in large numbers to combat millions of froghoppers that are now infesting the sugar-cane fields. These insects, which work devastation by sucking sap from the roots and leaves, have been known in the island for some time, but of late they have increased so rapidly that scientists have undertaken to find a means of exterminating them. One planter has established a special breeding place for lizards, which feed freely on the froghoppers. Special precautions are taken to prevent the destruction of the reptiles by birds or other creatures that might feed on them.

LIVELY BABY TANK PLAYS WITH GROWN-UP VETERAN

Everyone who has not already invented something for ending the war seems at present to be engaged in developing some sort of a one or two-man tank. Anyway many strange-looking motor-driven contrivances are making their appearance in different cities. One of the latest of these creations cut capers like a frisky colt around a powerful British tank in the streets of a New England city some days ago. It came out without its steel shell and thereby showed itself to be of interesting construction. The machine consists merely of a light runabout equipped with a new type of creeper tread that enables it to perform all kinds of feats.

Illustrating the Comparative Size of the British Tank and Its Unarmored American Cousin: The Tiny Machine Handles Itself Quite Well and Shows More Speed Than the Big One



How One Type of Fabricated Ship will Appear When Finished: One Concern is Building 150 of These Vessels, Each of 5,500 Tons' Dead-Weight Capacity, for the Government. For Purposes of Comparison an 80-Foot Submarine Chaser is Shown in the Foreground

NATION'S NEED BEING MET WITH FABRICATED SHIPS

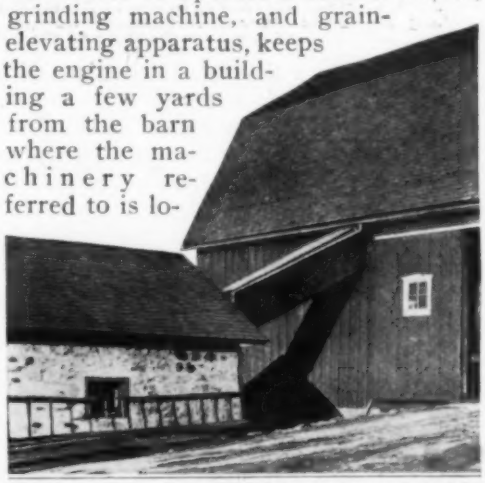
The "fabricated ship" is proving one of the most vital factors in solving the nation's big shipbuilding problem. The parts of vessels built by this new and more efficient method are finished in various shops and sent to the yards all ready for assembling. The time saved by this factory method, in which America has long shown such skill in other lines of production, is of the utmost importance. Scores of vessels of identical dimensions are being turned out, the parts being made and finished in busy shops scattered all over the country.

One concern has contracts for 150 cargo carriers of 5,500 tons' dead-weight capacity. Another is building 110 cargo vessels of 7,500 tons' dead-weight capacity and 70 boats of 8,000 tons' dead-weight capacity.

¶It is reported that the valued drug ichthyol is being found in the oil from wells in the Big Horn basin in Wyoming, there being 3 lb. per barrel of oil. Heretofore the oil fields of Roumania have been considered the only ones yielding this important by-product.

FARMER PROVIDES SHELTER FOR TRACTOR AND BELT

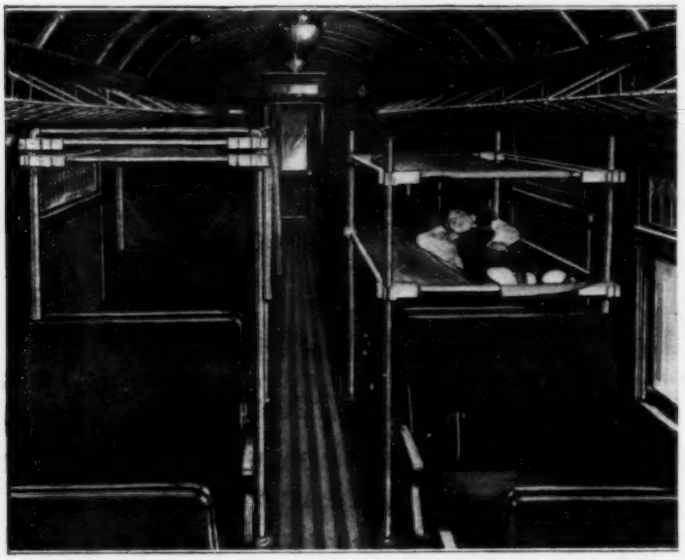
A progressive farmer who employs his tractor to operate a corn shredder, grinding machine, and grain-elevating apparatus, keeps the engine in a building a few yards from the barn where the machinery referred to is located. Power is transmitted from one building to the other by a belt for which a wooden housing is provided, connecting the two structures. In this way the entire equipment is kept under cover. Much of the inside work is reserved for rainy days.



The Housing between These Two Farm Buildings Shelters a Belt That Transmits Power from a Tractor to Several Pieces of Farm Machinery

NEW EQUIPMENT CHANGES DAY COACH TO SLEEPER

The frequent movement of troops in this country lends interest to an invention with which any day coach can be changed into a sleeper. It consists of a metal framework divided into units, each occupying the space allotted to two seats. Uprights support two rectangular frames on which canvas is stretched to form an upper and a lower berth. The latter can be raised during the day almost to the level of the upper one, giving access to the seats.



Day Coach Equipped for Use as a Sleeper: At the Right the Two Canvas Berths are Ready for Night Service. At the Left They are Raised, Making the Seats beneath Accessible. Curtains can be Provided as Shown near the Rear on the Left

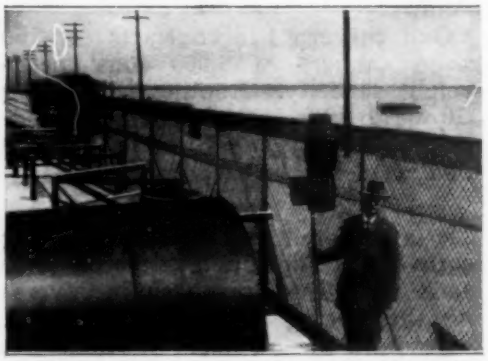
NICKELIZE ALUMINUM BY NEW PROCESS

A concern has recently announced that it has perfected a process of nickel-plating aluminum in sheets, wire, tubing, etc. There is a close resemblance between the new method and the usual process of electroplating. Aluminum, or aluminum alloyed with other metals, when nickelized can be given a very hard finish, it is said, and possesses a noncorrosive surface. Another advantage is that the plated is stronger than the unplated aluminum.

USE SALT LAKE'S BRINE IN AUTO RADIATORS

Last winter water from Great Salt Lake was used extensively as a nonfreezing liquid for automobile radiators. Chauffeurs driving one concern's trucks have employed the salt water for this purpose for some time, but last season there was a considerably wider demand for it. One company put it on the market in place of a prepared product and utilized three tank cars of the liquid. It was also treated by a secret process and marketed at various distant points, proving satisfactory, it is said. Radiators that are stamped out and have little soldering last the best with this Salt Lake water. Users point out that there is less corrosion than might be expected if the water is kept from the outer parts of the radiator and if the inner parts are kept moist by having the radiator well filled at all times.

In this connection it may be noted that the Bureau of Standards has recently issued a report on nonfreezing solutions for automobile radiators. The



Tank and Tank Car at Saltair Beach, Great Salt Lake, in Which is Stored Lake Water Used as a Nonfreezing Liquid for Auto Radiators

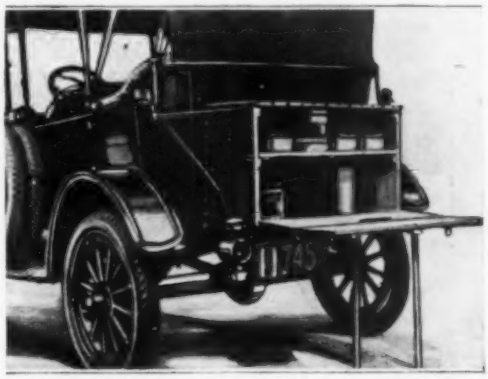
investigators concluded that calcium-chloride compounds should be used with caution, if at all, on account of their corrosive action. They declare that kerosene and similar oils should not be used on account of their inflammability, etc. Mixtures of glycerin and alcohol can be used, but now prices are almost prohibitive. Solutions made of either wood alcohol or denatured alcohol seem at the present time most desirable, the report declares. No reference is made to the use of Salt Lake water.

BRITISH ISSUE DECORATION FOR FIRST AT FRONT

It has been announced by the British War Office that King George has approved the "Star of 1914" as a new decoration to be issued to officers, men, civilian medical practitioners, and nurses who served with the British expeditionary forces in France or Belgium between August 5 and midnight, November 22 - 23, 1914. The medal consists of a four-pointed bronze star bearing an oak-leaf wreath on crossed swords entwined by a ribbon inscribed, "Aug. 1914 Nov." At the bottom of the wreath is the royal cipher and at the top point of the star a crown. A ring attached to the latter is provided for the ribbon, which is shaded and watered in red, white, and blue.

NEW AUTO CABINET SUITED TO MANY NEEDS

A chest that can be adapted to carry baggage, camp equipment, etc., is a new accessory that attaches to the rear of an automobile. The chest door is made of three parts, an upper and a lower leaf, and a strip that extends between these two and is held in place by hasps. The door can be let down as a unit to be supported on legs and serve as a table, or the upper and lower leaves can be operated as separate doors.



General-Utility Cabinet for an Automobile: Can be Used with or without Shelves. The Door is Made in Three Detachable Parts

SECTION HANDS NOW LIVE IN PORTABLE CABINS

That every available box car may be used in actual transportation service, the Southern Pacific Railway has decided to replace the box cars, employed as dwellings by section hands, with portable cabins. These new shelters are of the knockdown type and can be quickly set up anywhere along the right of way. They are, if anything, a little more spacious than the cars.

Type of Knockdown Cabin being Built for Southern Pacific Section Hands, to Release for Transportation Service the Box Cars They Formerly Lived In

ADAPT SELF-SERVICE IDEA TO COUNTRY HOTELS

To improve the dining service in country hotels is the purpose of a revolving hot plate supplied with eight casseroles. The contrivance is installed in the center of a 54-in. round table seating five persons. Food is kept warm by an electric heater immersed in the water pan constituting the hot plate. A card at the side of each casserole indicates its contents. A flat rate is charged for a meal and the guests serve themselves. The arrangement gives instantaneous service at reduced cost. Also it meets the approval of patrons.

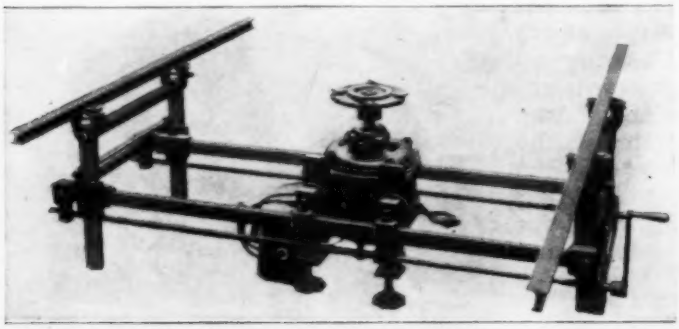
The Casseroles are Kept Hot by an Electric Heater Immersed in the Water Contained in the Hot Plate

POOR RUBBER RINGS CAUSE LOSS OF CANNED GOODS

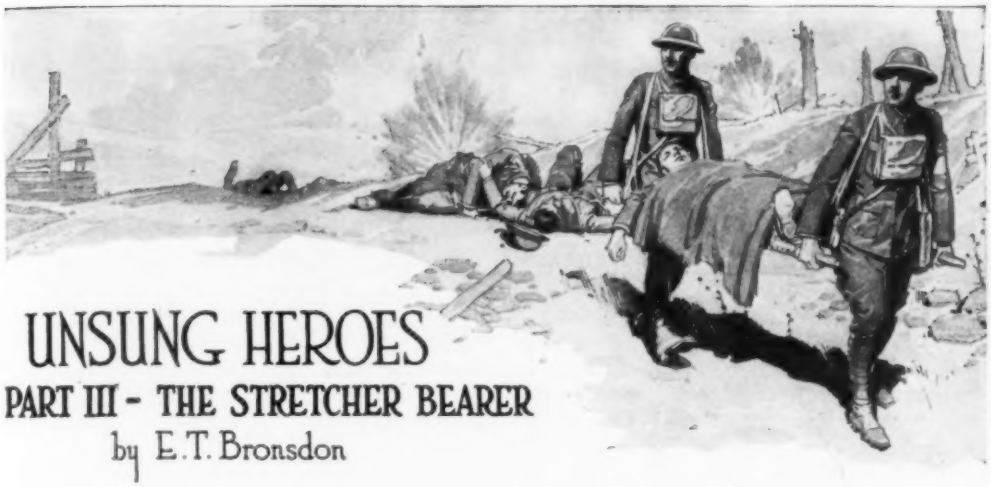
Rubber rings of inferior quality and of improper sizes are held responsible for much of the spoilage of canned goods the past year. Because of a good deal of complaint the Department of Agriculture carefully investigated the question and found that many of the rings were not sufficiently durable to be used in the cold-pack method. Not only must the rubber rings be able to withstand hot water and steam, but they must not enlarge very much when heated. Rings for standard jars should have an inside diameter of 2¼ in. and the width of the circular band should be from ¼ to ⅜ in. Government investigators have drawn up a set of specifications for rings, which have been adopted by the manufacturers.

DUBBING MACHINE AN AID TO FAST SHIPBUILDING

One of the newest labor-saving machines, invented because of the urgent necessity for faster shipbuilding, is an electrical dubbing machine that will do the work of about 25 men, each using an adz. It is employed in finishing the surface of frames of wooden vessels preparatory to planking, work that heretofore has been laboriously performed by hand. The cutting head with its set of knives is integral with the motor that revolves it, being mounted on the shaft of the latter. The unit is installed on a frame capable of universal adjustment, which can be moved forward and backward because suspended from two T-rails that are attached to the curved or flat surface of the boat. Movement to the right or left is obtained by means of two lead screws. The head is mounted between these screws and is raised and lowered for fine adjustment by means of three other screws working through ball and socket joints.



New Electrical Dubbing Machine Used in Finishing the Frames of Wooden Ships, Preparatory to Planking: It Does the Work of About 25 Men



UNSUNG HEROES

PART III - THE STRETCHER BEARER

by E. T. Bronsdon

"IN the 'orspital yer cawn't die. Yer *cawn't*. So carry on, matey! Grit yer teeth. And take 'im back quick, ye blank-blank idjits!" The last sentence contains the general orders, the thanks, and the requiem usually received by stretcher bearers.

There is no work in civil life, or in the organization of war, that is at the same time as arduous, as dangerous, and as thankless as this. The stretcher bearer's place is in the van of an attack, or in the rear guard that is covering a retreat. Without means of defending himself or "fighting back," he is compelled to take the greatest possible chances with his life always. His duty is to gather up all the wounded, no matter where they may be lying, and transport them immediately to the field hospitals.

When a wave of attackers starts across No Man's Land, a part of its personnel is a squad or two of stretcher bearers, perhaps more, depending upon the number of men in the wave and the chances for casualties. As the wave follows its barrage fire, a few men always drop. In spite of the protection afforded by the fire curtain, certain enemy positions—"pill boxes," snipers' posts, and machine-gun emplacements—are always shielded and able to keep up continuous fire. Besides, the enemy artillery is making mincemeat out of the whole waste strip, pouring in shrapnel and high explosive by the ton.

The stretcher bearers go part way with the wave, picking up the wounded and carrying them to the rear. A certain amount of judgment is necessary here, for the men requiring attention during an attack are always far in excess of the immediate accommodations, so the stretcher bearers have to choose between certain casualties and probable recoveries, saving only those who have a chance to get well under a surgeon's care.

If the attack fails, the stretcher bearer has his hands full. If it still is night, he goes immediately into the dark waste in search of wounded. The enemy, still far from convinced that the performance is over, is spraying the ground as from a huge nozzle. The man of mercy must take these chances, however, for the dozens or hundreds of boys who are lying out there are his comrades, depending on him for their chances of life or for surcease from pain until the end.

If the attack is successful, the stretcher bearers go up to the fire trench, there to remain until the word is passed that some one, sent out for patrol, raiding, or listening-post duty, is missing. Then the bearer goes out over the parapet and finds the missing man. On rare occasions—usually when the boche has many similar parties of his own out carrying in wounded—this work is undisturbed, but usually the Huns consider the stretcher bearer as legitimate prey.

The equipment of a stretcher bearer

is eloquent of the emergencies that he meets. First, and most important, he carries a set of tourniquets of all sizes. These are made to adjust to any part of the soldier's body where an artery may spurt. They are not the rough-and-ready devices known to army surgeons of our own Spanish-American War, but contrivances of steel and leather, notching to any desired degree of pressure with pawls and ratchets. The first glance at a wounded man tells the bearer whether blood is being lost in dangerous amount, and also, whether the application of a tourniquet is possible. The bearers have instructions to lose not a second where this instrument can be used.

An array of metal splints is second in the bearer's pack. Often a fallen soldier is so shattered that he cannot be moved without killing him unless reinforcements are attached to his mutilated limbs. Bandages, lint, and gauze, with a pot of lysol solution or iodine, supplement these. The bearers receive thorough training in antisepsis and bandaging, and while they are powerless often to prevent infection, they do give many thousands of wounded lads a chance at life and happiness by quick action in this manner.

Cordials and brandy, and occasionally rum, when the former two are not plentiful, are in the pack for the express purpose of "bucking up" lads that cannot be moved immediately. As expressed by Sergt. Louis Moulton of the Canadian contingent, who was one of the wounded lying on the field for 10 hours after the failure of the allied attack at Grandpré last fall, "I didn't think I'd pull through. The pain was so terrible that half a dozen times I fainted, each time to wake and think I was already dead and 'pushing up the daisies.' There were so many of us that the bearers simply had to take us in turn, the most urgent cases first. Every time one of them passed me I'd beg a little drink, though, and that would keep me going for another half hour. I didn't want the blue crosses, for then I'd have been taken for dead, sure."

The "blue crosses" mentioned stand for the last, and—in the eyes of the badly wounded soldier, at least—most important part of a stretcher bearer's pack. They are the morphia tablets—

"'There were so many of us that the bearers simply had to take us in turn, the most urgent cases first. Every time one of them passed me I'd beg a little drink, though, and that would keep me going for another half hour. I didn't want the blue crosses, for then I'd have been taken for dead, sure.'"

"I was right behind him, and thought sure he had been caught in the head, but in about a minute he was sitting up and looking around, dazed but unhurt. 'Some one sandbagged me!' he announced, blinking his eyes at O'Laughlin and myself."

morphine sulphate—and are of sufficient strength that one will dull pain for an appreciable period, while two will bring deep sleep. The usual practice is to give one to a man who is in pain but who is going to recover, and two to the chaps who have no chance. When the tablets are administered, the bearer marks one or two crosses on the forehead of the patient with indelible pencil, so that another bearer may not give an overdose through ignorance. Under ordinary conditions the first demand of a wounded man is for a drink. When this is supplied he asks for a "fag." Then, when he has this well lighted, he demands a blue cross. The bearer slips this under his tongue and then he is happy. Where thousands of dead, wounded, and dying are waiting their turn to be carried back, however, as was the case at Grandpré, many men feel that they will lose their chance if they are asleep, and so stick out the pain.

A page from the diary of Corp. Charles Larkin McConaghey, formerly attached as a stretcher bearer to the 92nd Overseas Battalion of the Canadian Grenadier Guards, will serve to show definitely the duties of a bearer in a prolonged engagement:

"Second day of the bombardment at Douai. The Germans are going to try something tomorrow or next day. At seven this morning they occupied a part of the front trench here, but were beaten off. The call for stretcher bearers came at eight.

"My first was Oglesby, bomber. He got his left thigh torn by a shell fragment. Ripped off the flesh and scraped the bone so that he bled a good deal. Put on gauze and lysol with tape, and then helped him back through the muddy trench to my dressing station in the ruined *estaminet* [tavern]. He could walk by leaning on my shoulder, but the mud sucked strongly at our feet in the communicating trench, and progress was painful. I left him at the dressing station, for he could wait, and nobody could make the field hospital until night fell, anyway. The Germans were dropping more shells behind the lines than they were placing in our trenches, it seemed.

"My second was a lad named Burke.

He had a machine-gun bullet or two in his back and couldn't walk. Cameron, O'Laughlin, and Swenson [other stretcher bearers] started to help me back with him. We got to the junction of the communicating trench with our second line. Burke was unconscious with the morphia I had given him. Lucky for him, poor lad! A shrapnel burst came so close that we all were knocked over. My ears rang all that day, but two of the others got it much worse. Swenson clicked ['trenchese' for died] with a bullet through the crown of his head, while the wounded man we were carrying was nearly cut in half by a sword's edge of bullets that slapped down perpendicularly onto the stretcher. We left Burke there and went back for more wounded and another bearer.

"I was lucky in unearthing three decrepit wheelbarrows, and these we fixed up, one with a regulation stretcher across it, and the others just filled with some dirty straw."

"Just as we were approaching the second-line trench, Cameron had a queer accident that might have been fatal. He was crouching—the parapet there was less than six feet in height—when suddenly he keeled over. I was right behind him, and thought sure he had caught it in the head, but in about a minute he was sitting up and looking around, dazed but unhurt. 'Some one sandbagged me!' he announced, blinking his eyes at O'Laughlin and myself. That instant he reached to the ground beside him and picked up a metal cone. 'There's the baby that did it!' he exclaimed, showing the shell fuse. And he probably was right. These fuses go off at funny angles when a German shell explodes, and are apt to kill or wound a man who has not the faintest idea that he is in the danger zone. The one that 'conked' Cameron must have hit the trench wall first before caroming off against his head, as it weighed three pounds and would have crushed a man's skull like a hammer cracks a pecan, on a direct hit.

"When we got back, the boys were laid out in rows waiting for us, and we got cursed for our slowness. In as quick order as possible I got Kaplan, another bearer, to help us, and then we carried back a half dozen boys to the dressing station. Billings, one of these chaps, was in a bad way. A 'screamer' [German 280-mm. shell, so named because of the noise it makes in approaching] had dumped about three tons of earth and sandbags right on top of his chest.

The boys had dug Billings out, but his ribs were smashed in and he was coughing up blood. I felt it my duty to stay with him and the others, two of

whom were seriously wounded, so I sent back the other bearers for more. While they worked, carrying in more men through the mud and water, I tried to keep up the boys' nerve until nightfall.

"It was a tough job. Cluskey, a recruit with the battalion who had an unfortunate amount of medical knowledge—just little enough to make him persistently objectionable—was sure he ought to be operated on immediately. I agreed with him, but there was no way in God's kingdom for men to traverse the mile and one-half of open country to a field hospital in daylight. I offered him morphia, but even that didn't appease him. Finally I just had to steel myself against his cries, so that I might do something for the others. A stream of wounded flowed in until every inch of floor space in the smashed *estaminet* was crowded, and we even had three on a bit of straw under a sort of lean-to which earlier in the year had seen service as a shelter for chickens.

"When it began to get dusk I went out to scout around for some sort of a conveyance, because we had so many wounded on our hands that it would have been a practical impossibility to carry them all in ourselves. I was lucky in unearthing three decrepit wheelbarrows, and these we fixed up, one with a regulation stretcher across it, and the others just filled with some dirty straw. Kaplan, O'Laughlin, and myself then started the arduous work of wheeling in the patients, with Cameron staying behind with the patients or alternating when one of us got fagged out. We worked till after three the next morning getting those chaps back, and all the time we had not a scrap of food or any rest except the little obtained while nursing the patients in the dressing station."

And this is a fair resumé of a day's work for the stretcher bearer. He is never thanked, never decorated for bravery, yet he works along, taking his chances for the lives of his comrades, and never complaining. Usually he "gets his" sooner or later. Corporal McConaghey met the "shell with his name on it" at Pozières while dressing a wounded man.

When it is all over, the real soldier is always more than willing to give the stretcher bearer his due. Let us, who do not have to lie for hours listening to the scream of shrapnel as we wait, wounded on the field, for the stretcher bearer's kindly ministrations given at the risk of his life, not think of him as anything but the brave and true soldier that he is.

MOUNTED-POLICE DOGS LINED UP ON "MEAT DAY"

THESE alert dogs, of which there are 40 belonging to the Canadian mounted police stationed at Fort Churchill, on the shores of Hudson Bay, are lined up to receive their rations of whale meat or blubber—a semiweekly event in summer and a daily occurrence in winter. The rest of the time the dogs must forage for themselves, but no matter how far they roam they never fail to be on hand at the feeding times. On those occasions they are tied apart as shown, to prevent a free-for-all fight, which with 40 dogs concerned, would prove anything but a trivial matter.

FAST TANK CARS TO CARRY FUEL TO OUR FLIERS

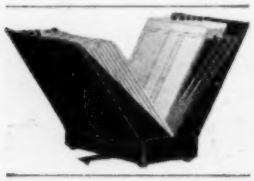
In response to the government's demand for fast automobile trucks capable of carrying heavy loads of gasoline

Oil-Tank Truck Designed to Supply Our Aeroplanes at the Front with Fuel and to Plow through Flanders Mud at a Good Speed

through the mud of Flanders to our aeroplanes, the machine shown herewith was produced and accepted by the authorities. More than 100 cars of this type are being shipped abroad. The tank has a capacity of 180 gal., and there is a compartment at the rear for cans and funnels. The wheels are equipped with pneumatic tires.

METAL FILE MAKES PAPERS EASILY ACCESSIBLE

An all-metal file box designed to hold records of accounts, etc., which



are referred to frequently, is made with two sides so hinged to the base that they can be spread apart, giving easy access to the sheets within, standing on edge. Stiff cardboard indexed guides are provided to divide the contents alphabetically and prevent thin sheets from folding up when the file is open.

ENGINEERING COLLEGES MUST HAVE MORE MEN

Because of the nation's future need, technical-school attendance must be increased above its present low level. Young men not eligible for military service are being urged by leading educators to consider the opportunities offered by technical training. The attendance at engineering schools has fallen off from 25 to 35 per cent since this country entered the war. The president has recently declared that "it is not only immediately necessary that as many students as possible should prepare themselves for engineering duties in the army and navy, but it is also of the first consequence to the country that there should be an adequate supply of engineers for the period of reconstruction that must follow after the war."

ROPE FIBER NOW OBTAINED FROM "WORTHLESS" YUCCA

Certain varieties of the yucca plant which grow in vast numbers in arid and mountainous regions in the West, and have long been considered practically worthless, are proving immensely valuable in rope making. The shortage of other raw materials in this industry promises to give new value especially to land containing granite, on which the yucca thrives.

The stalks, or spines, that are utilized grow in clusters about a central trunk which flowers beautifully at certain seasons. These tough spines are about an inch thick and an inch and a half wide at the base, and three feet long. On being harvested they are subjected to several processes. First, a crusher with heavy rollers is employed to treat them so that the cooker may act on them more readily. The

cooker is a large vat with tight covers partly filled with chemicals diluted in water. In this bath the spines are left for from two to eight hours at a temperature of 200° to 212°, the purpose being to separate the long fibers from incasing cellular tissue.

On being taken hot from the cooker, the stalks are fed between numerous pairs of rollers, some of them of corrugated steel and some made of rubber. When the shredded material has emerged from the last set of rollers the separating process is practically complete. After straightening it carefully on wire frames it is carried to outdoor racks to dry and bleach. With the completion of the curing, the material is compressed into bales of 250 to 350 lb. each, for shipment.

PLEASING BATHING SHOES OF PURE RUBBER

Bathing shoes of pure rubber are among the attractive new articles de-

The Pleasing Translucence of These All-Rubber Bathing Shoes can be Only Faintly Suggested in a Photograph

signed for summer use. They are of a buff hue, semitransparent, and have a finish that makes them resemble crêpe paper. In place of a lining there is a pure-rubber insole. The shoe is orna-

A Yucca Plant About 12 Feet High, in Full Bloom

Extensive Bleaching and Drying Racks Covered with the Fiber to be Used in Rope Making

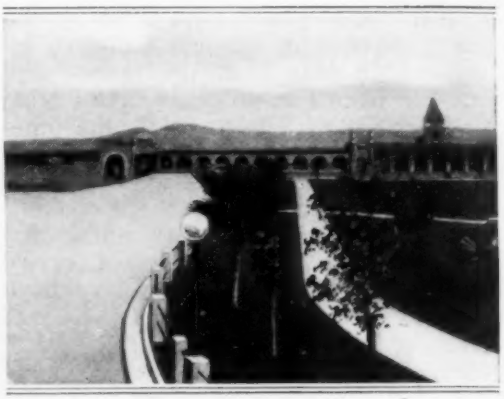
Ready for Shipment: Bales of Yucca Fiber Which has been Treated and is to be Made into Rope

Bundles of Yucca Leaves being Carried to the Crusher, where the Separation of the Fiber Strands is Begun

mented by a colored band extending around the top, a colored tip, and a rubber bow of the same hue, on the front.

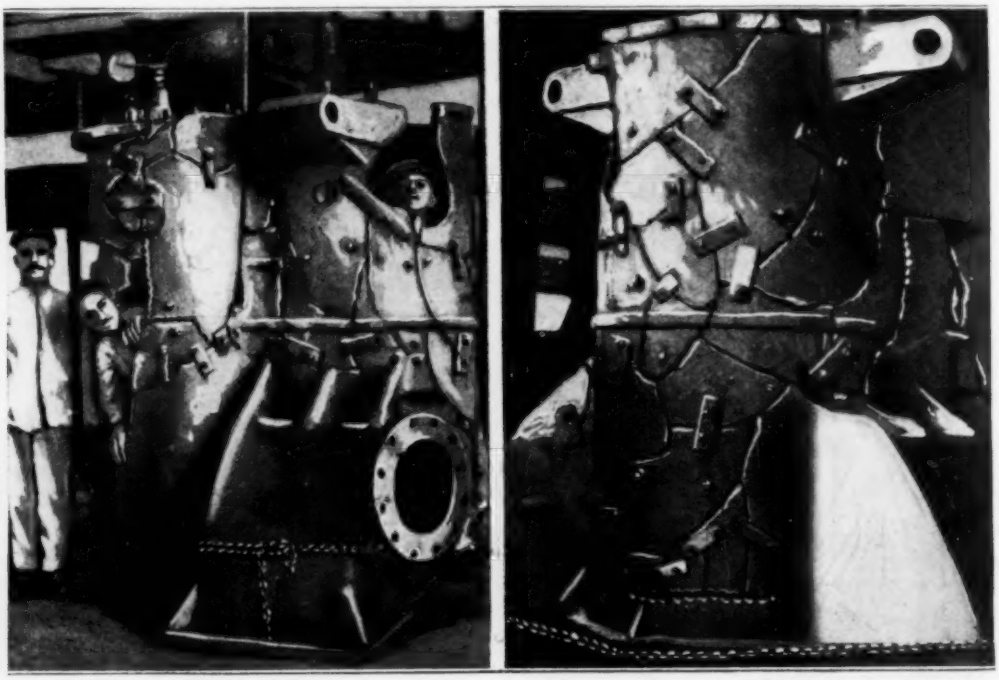
BRAZILIANS REPAIR SHIPS CRIPPLED BY HUNS

When Brazil took its stand against the Huns last October, the seamen aboard some 45 interned German vessels got busy with their sledge hammers. As in the case of the sailors who similarly injured ships in American ports, the crews imagined that German intelligence alone could repair the damage they had worked. The short-sightedness of the sledge-hammer type of intelligence, however, is interesting. The broken parts of the machinery were carefully stowed away between decks, instead of being forever hidden in the sea. It did not take engineering officers of the Brazilian navy long to exercise a different brand of intelligence. Cylinders, for instance, had been broken into hundreds of small pieces. These the Brazilians assembled and thereby obtained accurate measurements of the original castings, which were then duplicated.



The Civic Center of a Town Whose Founders are Facing This Attractive Plaza, Which

¶Plans are being drawn for flying boats which are to maintain an aerial passenger and freight service between Norway and Scotland. It is said the trip will be made in less than five hours.



COURTESY ENGINEERING, LONDON

Illustrating the Difference between German and Brazilian Intelligence: The Smashing was Done by German Sailors; the Repairing, Here Carried Out to the Extent of Assembling Small Parts and Obtaining Thereby Accurate Measurements of the Original Castings, by our Brazilian Ally

Looking Ahead: Though the Population of Ajo, Arizona, is Only 50, a Station and Stores have been Built will Meet the Needs of Many More. A Big New Smelter is Expected to Make This Town Grow

TOWN OF FIFTY SOULS HAS FINE CIVIC CENTER

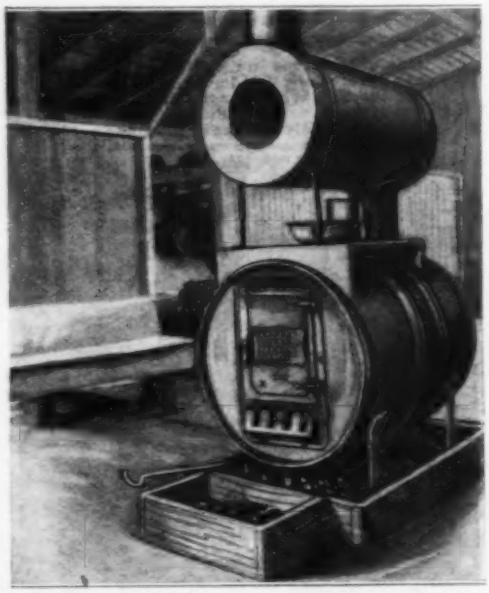
With a population of about 50 souls, the town of Ajo, Ariz., boasts of a civic center that would do credit to a metropolis. The explanation is that Ajo, being the site selected by a copper company for a $5,000,000 smelter, confidently expects to be a real city some day and has done some town planning. A central plot of several acres, surrounded by a horseshoe drive and an ornamental fence, has been laid out with walks, and planted with grass and trees, while in the center is a handsome concrete band stand. Already several buildings, including the depot and a number of stores, each designed in the Spanish mission style, have been erected facing the plaza.

BOXING AND BAYONET WORK HAVE CLOSE SIMILARITY

Soldiers at our various training camps are taught to use boxing gloves. One of several reasons for this is that boxing is strikingly similar to bayonet dueling. The comparison is illustrated by the butt stroke to the body, which is used to counter an antagonist's high thrust with a bayonet. At the completion of the blow the opponents are in positions analogous to those of two boxers. The difference, of course, comes in the fact that the rifle punch leaves no fight in the man receiving it.

SOLDIERS BUILD STOVE FROM OLD OIL TANK

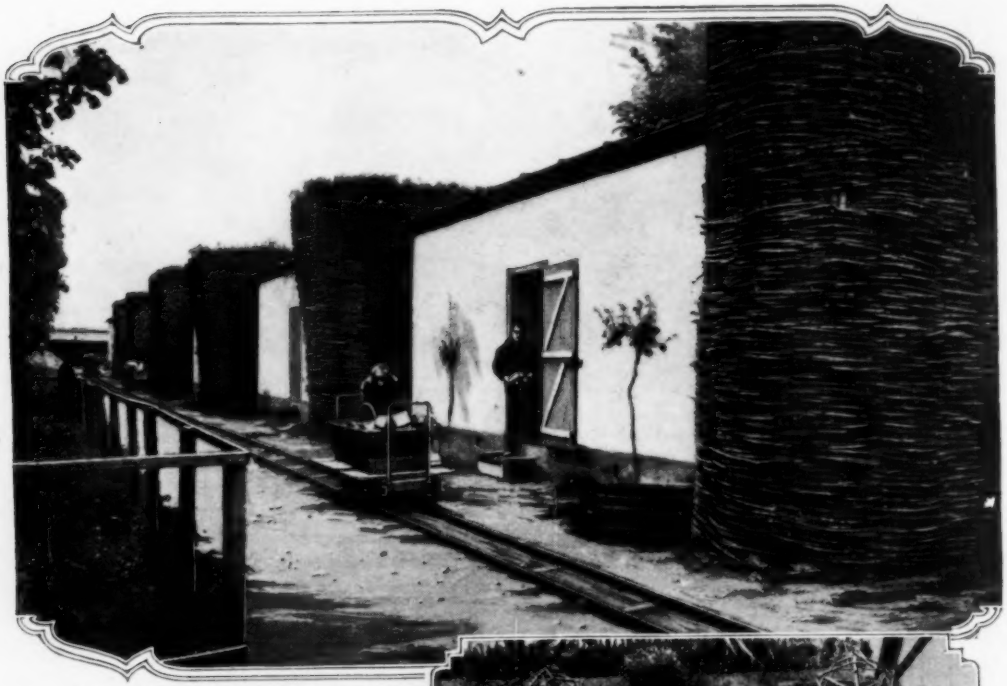
Soldiers employed in lumber camps in the Northwest have shown considerable ingenuity in constructing stoves for their bunk houses. One of the heaters is illustrated herewith. It is made from an old oil tank, an old stove door being riveted over an opening cut



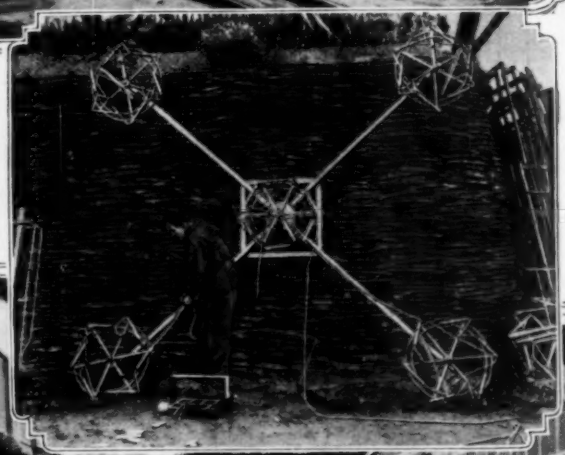
Stove Built by Soldiers in a Lumber Camp from an Old Oil Tank, above Which a Drum was Added

in one end and a hole cut for the smoke pipe, in the side. A drum through which the smoke passes was added to increase the radiation.

MAKING ELABORATE PYROTECHNICAL PIECES



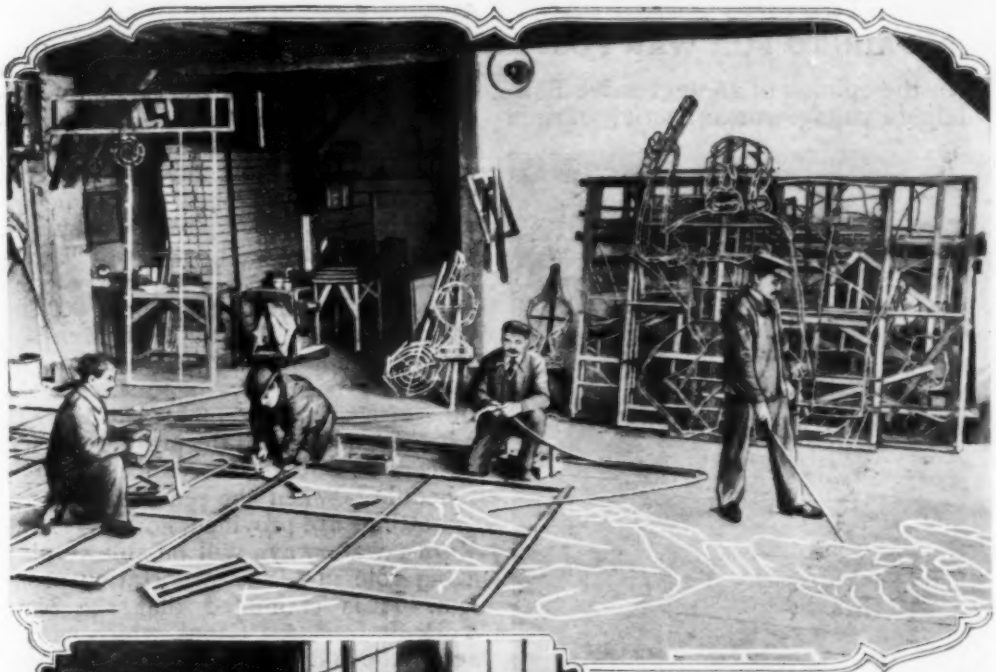
Chemicals are Stored, Ground, and Mixed in Small Frame Shops That are Separated from Each Other by Revetted Walls of Earth. This Arrangement Reduces the Fire Hazard



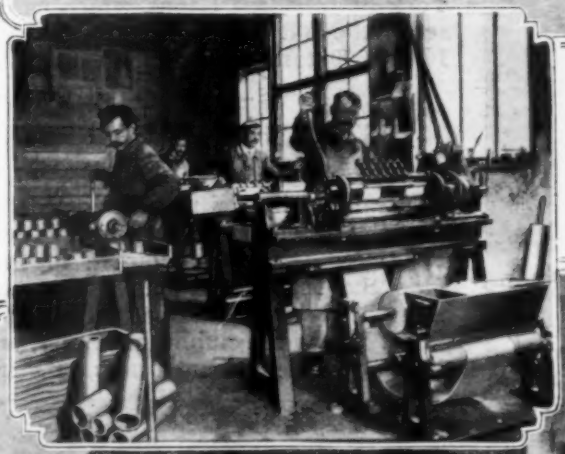
One of the Steps in the Fabrication of a Pyrotechnic Windmill: Connecting the Fire Wheels at the Extremities of the Vanes with Fuses. Work Like This is Often Done in the Open

After being Molded into Cylinders of Small Size, the "Stars" Used in Rockets and Roman Candles are Placed in Trays and Set in the Open to Dry. They are Made of a Paste Composed of Saltpeter, Ground Crystals, Sulphur, and a Binding Gum

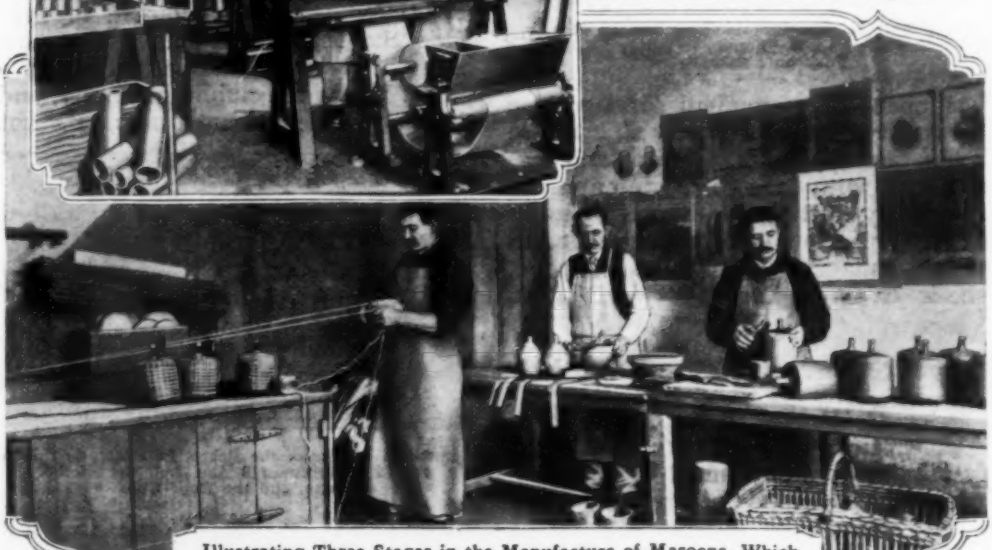
IN INTERESTING FRENCH FIREWORKS PLANT



In Fashioning Large Decorative Pieces, the Design is Chalked on the Floor, and over This Pattern the Framework is Built. This Method Materially Expedites Production



Making Tubes for Rockets, Candles, Fountains, and Crackers: Paper is Coated with Paste and Wound Tightly on a Cylinder. Revolving Knives Cut It in Desired Lengths



Illustrating Three Stages in the Manufacture of Maroons, Which Explode with a Cannonlike Report: The Heavy Paper Containers are Filled with Powder, Tightly Bound with Twine, and Dipped in Glue. After This the Fuses are Inserted

GIRL STUDYING AEROPLANE REPAIRING FOR WAR POST

In the opinion of an aggressive Philadelphia young woman, aerial warfare

This Philadelphia Girl is Learning to Repair Aeroplanes and Intends to Apply for a Position at the Front

has opened a new field for feminine versatility and patriotism. Therefore she is taking a course in aeroplane construction with the avowed intention of eventually getting to France. Knowing that many experts will be needed to repair damaged planes in the war zone, she is preparing herself for such work.

GOVERNMENT TAKES CONTROL OF NEW YORK'S CANALS

Control of the New York state canal system has been assumed by the government. It will be operated under the supervision of the director general of railroads, Secretary McAdoo. Before this is possible, however, barges must be constructed, for although the great terminals and locks are completed and awaiting use, the waterways are without boats. The government's program therefore includes the fabrication of several hundred steel barges of about 700-tons' capacity. These, it is announced, are to be of the most modern construction and improved type and will be operated in conjunction with the country's general railway and waterway transportation systems. The first of the barges, estimated to cost about $60,000 each, were, at the time of Mr. McAdoo's announcement, expected to be ready for use early in June. At the time of writing it remained to be seen whether that part of the program would be carried out in accordance with the schedule. When the required number of bottoms are provided, however, New York's waterways will be able to play a big rôle in the transportation problem. It is estimated that the New York State Barge Canal, which supersedes the old Erie Canal, can handle 10,000,000 tons of freight in a season.

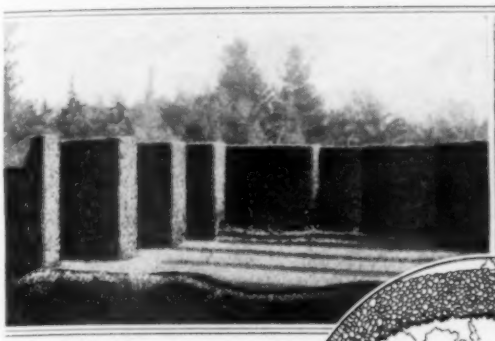
JUSTICE'S HOME PAINTED RED, WHITE, AND BLUE

"Strategically situated" beside a smooth stretch of the Lincoln Highway where motorists are tempted to open wide the throttle, stands the modest home and court room of a justice of the peace. That the public generally, and the many speeders fined here, may not

Home of a Justice of the Peace, Patriotically Painted: The Trimmings Are Red, the Walls White, and the Roof Blue

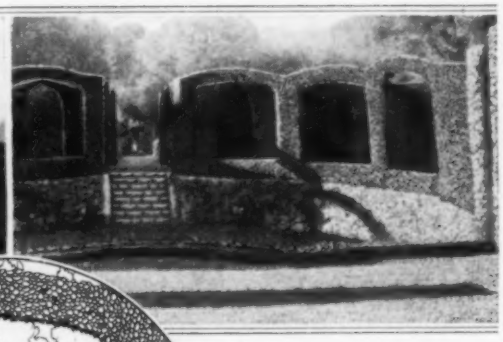
mistake his sentiments, the justice's house is painted in patriotic colors, the trimming being red, the walls white, and the roof blue.

TRIM HEDGES FORM WALLS FOR OPEN-AIR THEATER



Stage of the Open-Air Theater Showing the Hedges That Serve as Wings

Viewing a Performance in the Open-Air Theater from a Hedge-Inclosed Box

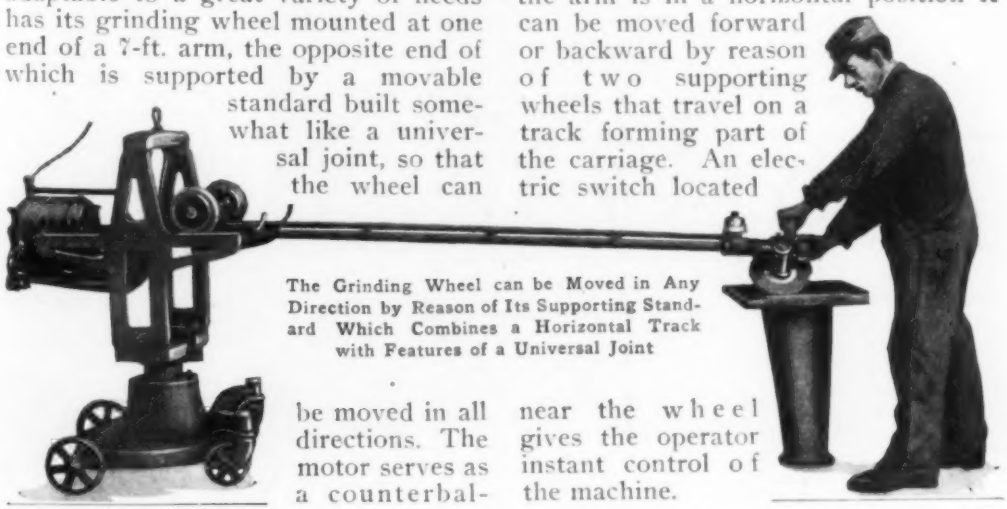


View of the Parquet and Four of the Green-Walled Boxes from the Stage

On the grounds of a California estate is an open-air theater, inclosed by hedges, which is as novel as it is beautiful. The stage occupies a terrace in front of a sunken grass plot, and is bounded by wings and a background composed of hedge walls trimmed with geometric precision. Even more striking are the boxes either side of a path leading to the parquet, each inclosed by hedges and having an arched outlook facing the stage. A short flight of stone steps leads from the path down to the sunken area. Outside the hedges stand large trees that add much to the beauty of the rustic spot, giving it a very pleasing air of seclusion.

NEW GRINDING MACHINE MEETS MANY NEEDS

A new grinding machine which is adaptable to a great variety of needs has its grinding wheel mounted at one end of a 7-ft. arm, the opposite end of which is supported by a movable standard built somewhat like a universal joint, so that the wheel can be moved in all directions. The motor serves as a counterbalance for the grinding member. When the arm is in a horizontal position it can be moved forward or backward by reason of two supporting wheels that travel on a track forming part of the carriage. An electric switch located near the wheel gives the operator instant control of the machine.



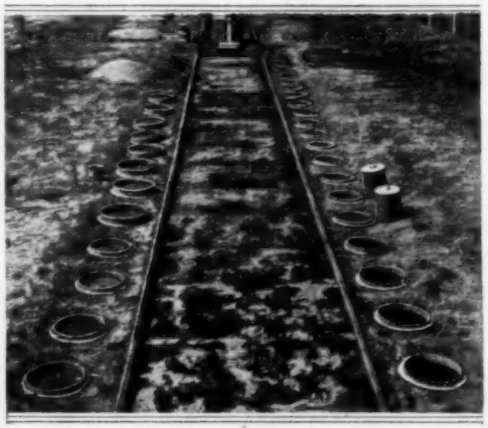
The Grinding Wheel can be Moved in Any Direction by Reason of Its Supporting Standard Which Combines a Horizontal Track with Features of a Universal Joint

One of the Important Field Laboratories, Where Extensive Investigations are being Made, is Situated at Reproduced Above. The Instruments Employed Furnish Continuous Records of the Relative

GETTING NEW FACTS ABOUT WATER EVAPORATION

By W. T. STANLEY

THE United States Government is not satisfied with what is known about the evaporation of water from the soil, particularly in connection with irrigation. In not a few cases the amount of water losses through this cause has a bearing on the success of an irrigation project, and as various kinds of soil are differently affected, it is essential for government engineers to know just where they stand on this subject. As it is more or less an undeveloped science, they have found it necessary to make their own experiments.

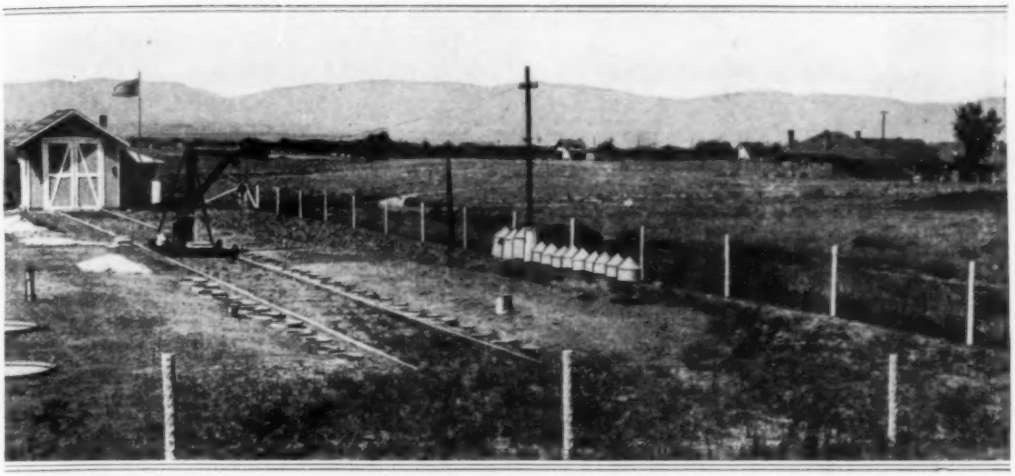


On Each Side of the Track Are Galvanized-Iron Tanks, of Varying Diameters and Depths, That are Used in Surface-Water Evaporation Tests

This is being done at certain field laboratories established by the Office of Public Roads and Rural Engineering in the Department of Agriculture. One of these district branches is located at Denver, where a field laboratory possessing unusual advantages is maintained. This plant affords facilities for research work far less artificial than one would expect in the vicinity of a big city.

The new field laboratory is almost a prairie homestead itself. On three sides it is open country for a distance of from one-half to five miles; on the fourth, the north side, it is partly built up with a few low houses. One-half of the two-acre tract is flat; the rest of it slopes off, in some places as much as 20 per cent. Yet it has all the conveniences of a city location: water supply, electric power, trolley-car lines, and local delivery from Denver business houses.

Practically all the research work is carried on in the fenced-in field, and there is only one building on the plant, a small shop and record office. The laboratory is equipped with a large

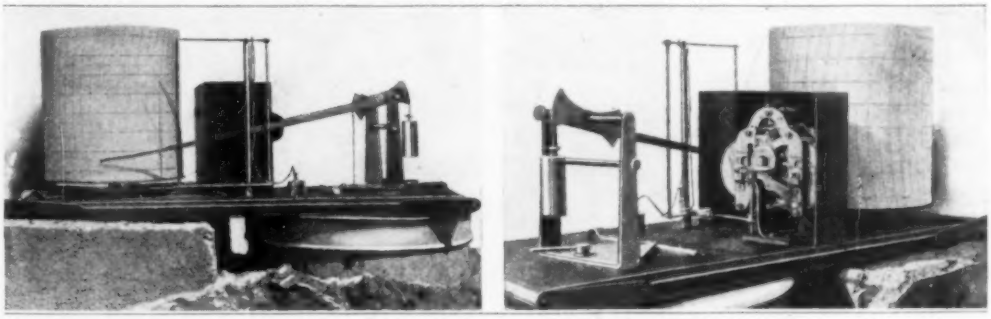


Denver. Most of the Work is Conducted within the Small Fenced Tract Illustrated in the Photograph Humidity, Atmospheric Temperature and Pressure, Water Temperature, and Rate of Evaporation

number of apparatus, including thermometers, barometers, psychrometers, and other evaporation-recording instruments. Many of them were purchased, but whenever the irrigation engineers need an instrument which does not exist, they simply invent it themselves. A man connected with the field laboratory at Berkeley, Calif., has designed and built what is known as an "evaporimeter," which records on a sheet minute variations of the water level in evaporation experiments. This is used, together with other instruments, for meteorological observations. In the average laboratory, only two readings are made a day, but at the Denver plant continuous records are maintained by instruments, showing the relative humidity, temperature of the air, temperature of water in evaporation tanks, rate of evaporation, atmospheric and wind pressures, and other important information. All these instruments are housed in a shelter such as the Weather Bureau uses.

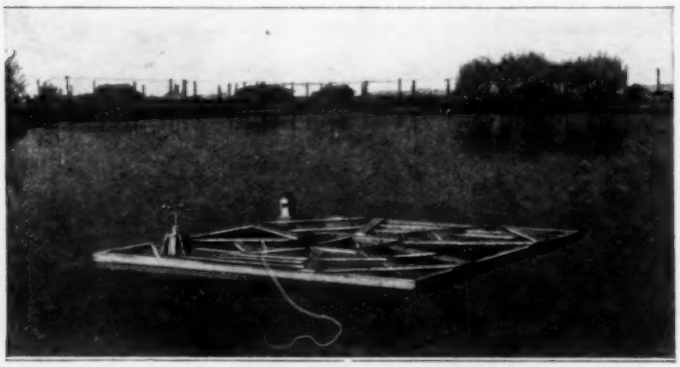
During the season when the weather permits it, the Denver field laboratory conducts four different kinds of experiments. The government experts are, for instance, making an investigation into the evaporation of water surfaces, such as a tank or a lake; they are studying the evaporation that takes place from sand surfaces and from the laboratory soil; they are experimenting with the flow of water in small furrows. All of this is done on the two-acre tract.

For the water-surface evaporation experiments, 26 galvanized-iron tanks, ranging in diameter from 1 to 12 ft. and in depth from 3 in. to 6 ft., are used. Measuring gauges facilitate the making of records. Some of the tanks are kept at different temperatures,



A Special Instrument of Great Delicacy is Used in Measuring and Recording Variations in the Level of the Water in Evaporation Tests. It is Known as an "Evaporimeter," and was Designed Particularly for These Experiments by One of the Laboratory Workers. Two Views of It are Presented Above

while others permit observations and comparisons of how much water escapes by evaporation from flowing water and from a still body of the same shape and area.



Ingenuity is Shown in the Methods Employed in Measuring the Evaporation of Lake Water. The Frame Pictured Here Supports a Tank, the Contents of Which are Subjected to the Same Conditions as the Surrounding Water

One of the most interesting subjects is that conducted to determine the losses of water from soil surfaces. Leading from the record office is a long iron track, beside each side of which is a set of 28 tanks, flush with the ground. Each tank is a double water-jacketed affair, consisting of an outer galvanized-iron tank, inside of which is set a smaller one filled with soil or other material used in the experiment. The space between the two is filled with water, by which the temperature is controlled. This also facilitates the weighing of the inside tank, with its contents.

Now, it is a simple matter to maintain the water level in each of these tanks by the simple expedient of adding water at the top. The loss by evaporation is determined by weighing the inner tank, a special hoist running on the track having been built for this purpose. The weights vary between 370 lb. and a ton.

The furrowing experiments are also interesting, although they are not so far advanced as the others. A series of seven furrows was built on different grades to duplicate those used in the irrigation of orchards and crops laid in rows. Small flows of water were run down in each, likewise to imitate the usual furrow irrigation, and observations have been made that indicate just what the evaporation is under varying conditions. During the winter, much of the experimental work is carried on under shelter.

The wide possibilities of the experimental work at the irrigation field laboratories, of which that at Denver is an excellent example, can be seen from the figures of the Reclamation Service which show that up to the first of 1915, the government had 2,551,247 acres under this development and had expended up to that time $98,001,205. This included over 9,000 miles of irrigation canals and ditches, involving excavation of over 122,000,000 cu. yd. of material. In addition, the government built numerous dams. Incidentally, the value of irrigated crops grown on the reclamation projects under operation by 1915 was about $16,500,000. Since that time many more acres of irrigated land have been opened up in different states.

Seven Narrow Furrows Arranged Parallel to Each Other at Different Levels Enable the Laboratory Attendants to Study at First Hand Some of the Various Field Conditions Encountered by the Orchardist and Farmer

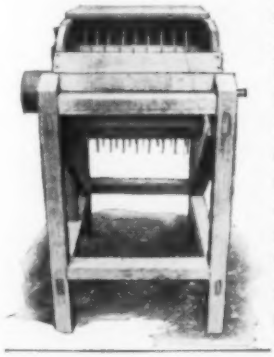
TOBACCO MAKES LOUISVILLE STREET WORLD FAMED

Main Street in Louisville, Ky., is one of the show places of the world in the same sense that Chicago's grain pit and Wall Street's stock exchange share honors for similar distinction. It is in Main Street, at Louisville, where tobacco is cock of the walk, that many of the South's great tobacco merchants hold forth. And it is there also that hundreds of thousands of hogsheads of leaf tobacco are sold on the block to buyers from the country over. Kentucky grows a third of the tobacco produced in the United States and millions of dollars' worth of it are auctioned annually in hogshead-filled Main Street.

Saturday Morning and All Is Quiet in Main Street. Tuesday and Wednesday Are the Big Auction Days When Hogsheads of Tobacco Block the Traffic

BROOM CORN ON "BAD ACRE" BRINGS BIG PROFIT

An instance of highly profitable land reclamation, under rather out-of-the-ordinary circumstances, is to be found on a valuable Indiana farm, one acre of which had long been considered worthless because no way could be found to drain it properly. Finally, at the suggestion of a friend, the owner tried draining it by blasting with dynamite and then planted broom corn on it. The experiment proved decidedly worth while. From the broom corn that was raised, 400 brooms were made which sold for $300. Other proceeds brought the revenue up to $390, while the expenses, including $50 for draining and removing stumps, and $90 for making the brooms, were $190, leaving $200. The seed cleaner used in preparing the corn is shown above.



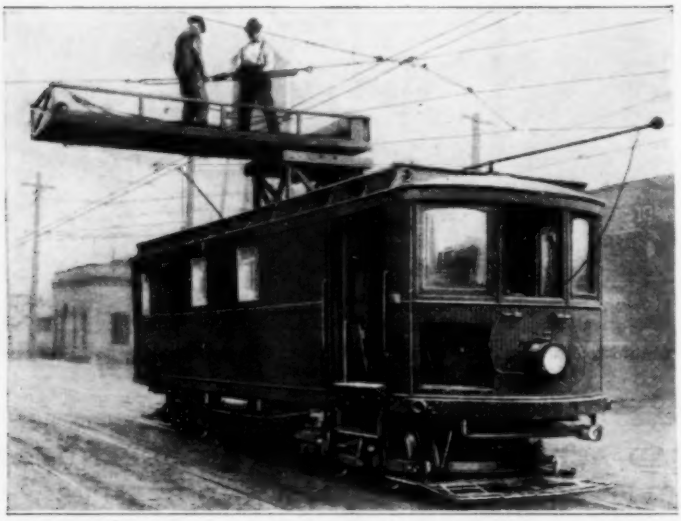
EAGLE POSES AS DEFENDER OF STARS AND STRIPES

While it is rare that a live eagle is photographed in the open at close range, it is even less frequent that a picture is obtained of one of these majestic birds perched beside an American flag, as if acting as its defender. The eagle shown here with, which measures 9 ft. from tip to tip of the wings, was crippled by a rifle shot, which fact accounts for the unusual picture.

Shot in the Left Wing, This Big Bird Consents to Pose as a Defender of "Old Glory"

TOWER ON REPAIR CAR OPERATED BY AIR

A repair car, now in use on a large traction line, is equipped with a tower operated by compressed air obtained from the air-brake system. An air cylinder, 10 in. in diameter and 7 ft. long, actuates the raising and lowering mechanism. Valves located at either end of the car afford control of the pressure, which is sufficient to hold the working platform in place 20 minutes. The platform measures 14 by 4 ft., and is pivoted at one end so that it can be swung around by one man.



The Tower on This Repair Car is Raised and Lowered by Compressed Air Obtained from the Air-Brake System. When It must be Supported for More Than 20 Minutes, Chains are Used to Hold It in Place

SAVE TIN BY PACKING JAM IN CARDBOARD

One of the ways that Great Britain has met the shortage of tin plate is to use cardboard instead of tin containers for the jam of which the British soldiers are so fond. The substitutes are now being used for several other articles besides jam, and the weekly output of the nonmetallic containers is more than 3,000,000 per week. Another method of saving tin plate has been to employ cardboard boxes in place of tin ones for crackers and dried fruit.

FILL ORDER FOR NAVY IN RECORD TIME

Navy officials have recently related with justifiable pride an example of how war work can be speeded up. A firm engaged on work in connection with destroyer materials was in urgent need of a crane, but was told by the manufacturers that it could not be furnished in less than 60 days. A personal appeal was made to the crane builders and their foreman, who then decided that they could cut the time in half. Further conference showed that if another crane, also a navy order, could be delivered and so gotten out of the foreman's way, it would help matters a great deal. This assistance was assured. Arrangements were also made to send the patterns to the foundry, 60 miles away, by motor truck and bring the castings back the same way. As a result of this all-round coöperation the much-needed crane was shipped in 15 days.

THOUSANDS PLAY CAGE BALL AT NAVAL STATION

Many of the healthful features of push ball, basketball, and football are incorporated in a new game that may be played by an almost unlimited number of persons. It is unlike all other sports in that it is designed solely for the benefit of its participants, instead of being for exhibition purposes. Cage ball is the name of this remarkable game, in which the contesting teams may be composed of from 10 to 10,000 men. It had its origin at the Great Lakes Naval Training Station during the winter months and has since demonstrated its value for camps and cantonments where the participation of

When Cage Ball is Played No One Needs to Stand on the Side Lines and Wish for a Chance to Exercise, for There Is Plenty of Room for Everybody

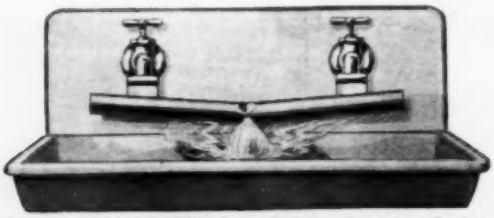
The Photographs Above and Below, as Well as the Drawing, Depict Tense Moments with the Big, Inflated Ball Perilously Close to the Goal Basket

everybody in combative-team games is desirable.

The dimensions of the field on which cage ball is played are determined by the number of persons engaged. A space 150 ft. long and 100 ft. wide has been found satisfactory when 2,000 men play. Two goals, similar to, but larger than, basketball goals, are provided at opposite ends of the field. They consist of iron-pipe frames, 8 ft. high, that support nets, 6 by 4 ft. in measurement. An inflated ball, of 22-in. diameter, is charged by the opposing team when it is tossed into the air at the center of the rectangle by the referee. The rules are few, and in general are somewhat like those of basketball. The ball may be batted, punched, or thrown, but not kicked or carried. When it touches the ground it must be raised above the heads of the players and put in motion. While it is thus being tossed into the air, other players must not charge, nor pile upon the ball or those in possession of it. When it goes to the ground, and the players stack up as in football, the referee's whistle stops play. The ball is then thrown by the official 20 ft. toward the center of the field. The same rule applies when the ball goes out of bounds. When a player succeeds in throwing the ball into the goal cage of the opposing team, one point is scored for his side. At the naval station the players on one team wear their regulation white uniforms, and those on the other, their blue ones.

WATER-MIXING ATTACHMENT FOR HOT AND COLD TAPS

A new attachment with which a hot-water and a cold-water faucet can be



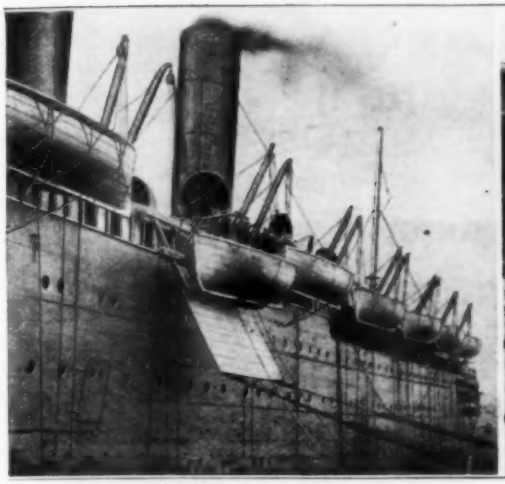
Attachment with Which a Single Stream of the Desired Temperature can be Obtained by Manipulating the Hot and Cold Faucets to Which It is Fastened

connected enables the user, by proper manipulation of the taps, to obtain a single stream that is neither too hot nor too cold. It consists of a trough-like member having a hole in the center and clamps near either end for attaching it to the two faucets. The trough is slightly bent in the middle so that when in place the water from each tap flows to the center and out through the one opening.

ELECTRIC CROSS GUIDES THOUSANDS TO MOUNT

This picturesque outdoor service, patterned after the observance held each Easter morning on Mount Rubidoux, Riverside, Calif., is being conducted on Eagle Rock, near Pasadena. Only a portion of the throng of 10,000 persons who are gathered here are shown in this picture. Many of them made their way to the height, long be-

Thousands of Worshipers Gathering before Sunrise Easter Morning about the Electric-Lighted Cross on Eagle Rock, near Pasadena: This Picturesque and Impressive Service has Become an Annual Event



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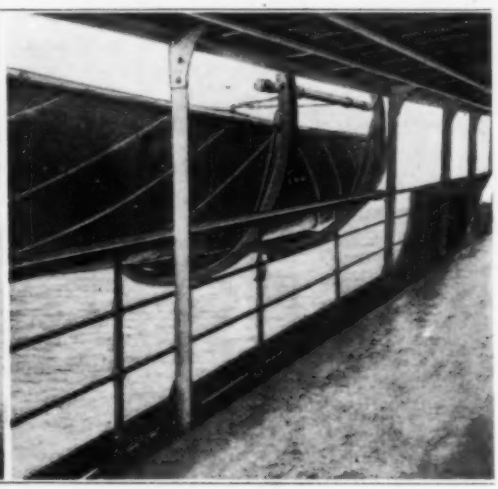
Test Approximating Condition Presented in Launching a Lifeboat from the High Side of a Listing, Sinking Vessel



The Steel Arms Prevent a Lifeboat from being Broken or Upset When Passing the Rails, Guards, or Uprights of a Ship

fore daylight, guided by the 30-ft. cross, the outline of which was made brilliant with electric lights.

SUN TAKES GREAT VOLUME OF WATER FROM LAKE

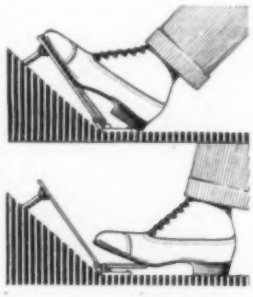
Evaporation of water from Gatun Lake, Canal Zone, reached a new high record during the month of March, this year. Calculations show that the sun withdrew 3,248,000,000 cu. ft. of water from the body, the equivalent of 1,213 cu. ft. a second for the period of 31 days. This was one cubic foot a second in excess of the volume of water passing through the penstocks of the Gatun hydroelectric station, which, during the same month, produced 4,681,000 kw.-hours of energy. This in turn shows the loss of potential current due to the sun's effect.

CRADLE ENABLES LIFEBOATS TO BE LAUNCHED SAFELY

Naval authorities are manifesting much interest in a launching cradle lately developed for lifeboats. The apparatus enables a small craft to be lowered from the high side of a listing, sinking ship without difficulty. More important still, it is supposed to overcome the danger of a lifeboat being dashed to pieces against the side of a vessel at such times. The cradle consists essentially of two curved steel arms that are held in place by chains. They extend about a foot beyond the keel and the same distance above the gunwale on one side of a boat, serving as a skid that protects the boat from being broken on the rails, guards, or uprights in its descent to the water.

ACCELERATOR FOOT LEVER RESTFUL FOR DRIVER

To enable a motor-car driver to escape muscular fatigue by frequently changing the position of his right foot while operating the accelerator, a special pedal has been designed. With it installed, the leg need not be extended the same distance all of the time. The toe, heel, or whole foot may be used in different places. A horizontal extension for short-limbed persons obviates the strain of overreaching. The device is convenient for tourist and city driver alike.



New Scarlet-Fever Ward near the Main Salt Lake County Infirmary in Utah, Said by Physicians to Be One of the Finest Buildings of This Character in the Country

EXHIBIT TELLS EMPLOYES OF TWOFOLD WASTE

An antiwaste exhibit with an unmistakable patriotic appeal was recently loaded on a storage-battery truck and drawn through a large plant for all employes to see. It consisted of a pile of foodstuff fragments, worth from $35 to $50, and a pile of scraps collected in

Loaded Storage-Battery Truck Driven among Employes of a Large Plant to Discourage Waste of Food and Factory Materials

the factory, worth some hundreds of dollars. A sign read: "Wasted. Food Brought from Your Homes. Material Belonging to the Company."

NEW SCARLET-FEVER WARD EMBODIES LATEST IDEAS

A one-story fireproof structure, said by physicians to meet the most exacting requirements pertaining to the care of contagious diseases, has recently been erected some 200 feet from the Sale Lake County infirmary, in Utah, as a scarlet-fever ward. It cost $16,000, and contains two general wards and six private rooms, accommodating in all 26 patients. At the south end is a spacious sun parlor for convalescents. This is the first of four contagious-disease units to be built this year, the others being for smallpox, diphtheria, and measles.

AIR SPRAYS PROTECT DAM GATES FROM ICE FIELD

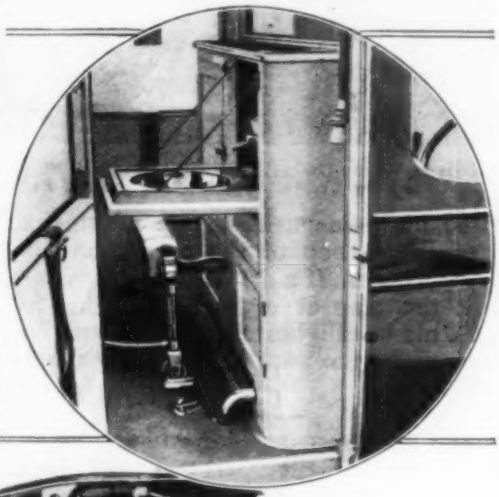
Extraordinary measures employed last winter at Keokuk Dam to prevent ice on the upstream side from damaging the spillway gates have been vindicated. Recurrence of damage wrought during previous winters was averted in the face of conditions as severe probably as any that may be experienced hereafter. An elaborate pneumatic system, designed to agitate the water before each of the 119 gates and prohibit the formation of ice during below-

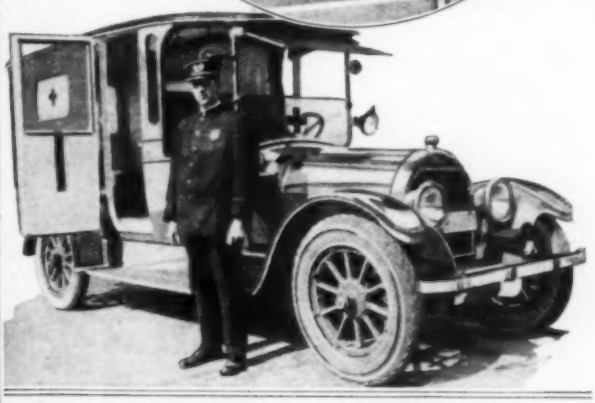
zero weather, was installed. The arrangement consists in part of a supply main, 4,270 ft. long, extending across the dam from the power house. It carries dried air under pressure to discharge pipes placed midway between the piers at points a foot in front of each gate and 10 ft. below the surface. These tubes are held vertically and fitted with needle-point valves. Each is able to deliver 2 cu. ft. of air into the water every minute, although this is more than is normally necessary. The result is the maintenance in front of each gate of a semicircular open space. While protecting the gates, the scalloped openings allow the ice, sometimes more than 2 ft. thick, to bear against the piers. The system has proved its ability to melt the ice faster than ordinary exp: nsion can move the enormous field forward toward the spillway gates.

WELL-EQUIPPED AMBULANCE HOSPITAL ON WHEELS

In the service of a hospital in one of the western cities, there is a new motor ambulance that is excellently outfitted for emergency cases. In addition to the usual stretcher cot and folding wall bench, it contains an operating table and is supplied at the front end with a cabinet containing a lavatory, refrigerator, and vacuum-bottle compartment. Hot and cold running water, heating facilities, incandescent lights, and an electric fan are also included in the accessories. The interior of the car is finished throughout in white enamel.

¶The New Zealand government recently took over an estate of some 31,000 acres for the benefit of returned soldiers, and to make it suitable for them it was necessary to kill or capture no less than 120,000 rabbits.

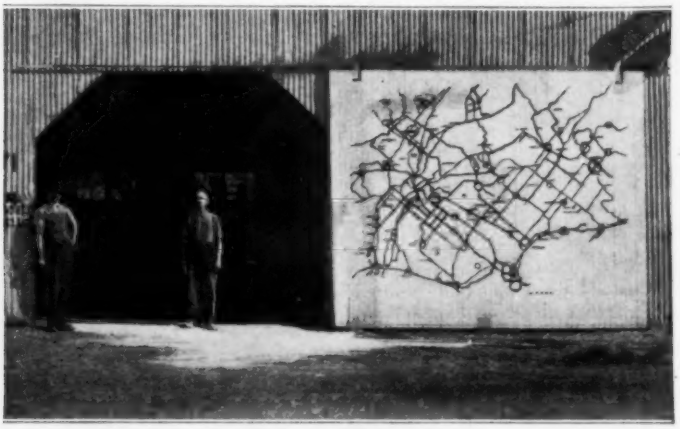




In the Circle at the Top Is the Cabinet That Contains the Lavatory, Refrigerator, and Compartment for Vacuum Bottles. On the Floor, in Front of It, Is the Heater. A General View of the Interior, Showing the Stretcher in Place and the Wall Bench Folded Back, is Given at the Left. The Other Picture Shows the Side Door of the Ambulance, a Feature Found in Few Machines

OWNER OF GARAGE PAINTS BIG AUTO MAP ON DOOR

A California garage owner has performed a much appreciated service for motorists, and at the same time advertised his own business, by painting a large road map of the region on his garage door. If a driver wishes to consult the map at night he has but to turn his headlights on the door and he can study the various routes without difficulty.



A Garage Whose Owner has Shown Unusual Enterprise by Painting a Very Helpful Road Map on the Big Rolling Door

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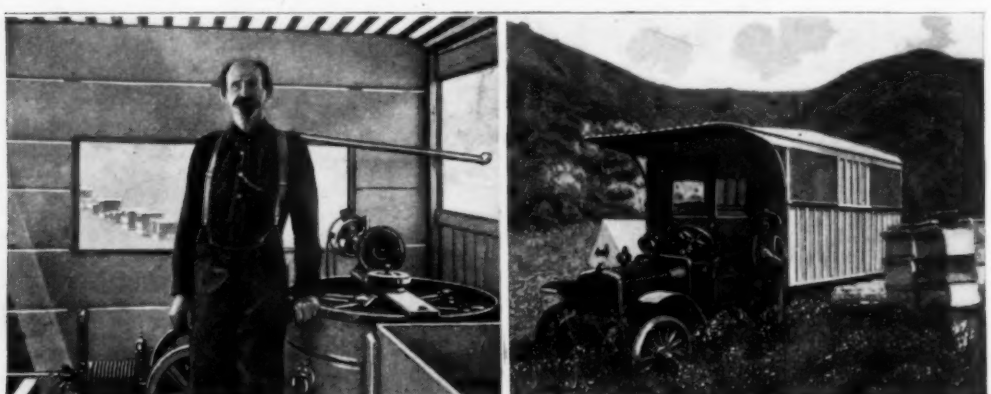
¶The first transport for Atlantic service built on the Great Lakes was launched a few weeks ago at Sturgeon Bay, Wis. It is 261 ft. long and has a 42½-ft. beam.

CANADA REMOVES DUTY FROM FARM OUTFITS

A recent ruling by Canadian authorities permits the free admission into Canada of teams, implements, etc., for farming, provided they are reexported before Dec. 31, 1918. If, during the period of temporary admission, one takes up land and becomes a bona-fide settler he can enter his farming outfit free of duty as settler's effects. As a further inducement to greater crop raising in Canada, tractors and other power-driven farm machinery, which heretofore could not be brought in as settler's effects, will be admitted duty-free, subject to the usual conditions. No doubt many Americans will profit by the ruling.

MOTOR TRUCK EQUIPPED AS PORTABLE APIARY

A California beekeeper, who each year moves his bees to three different points for the sake of increased honey yield, has a thoroughly modern, portable apiary in the form of an automobile truck, especially equipped for the



Left: Interior of the Truck Body, Showing the Motor-Driven Extractor Used in Preparing Honey. Right: Beehives Set near the Sagebrush, and the Especially Equipped Auto Truck in Which They are Moved About

purpose. The large, light body has wide screened windows in the ends and sides. Within is installed an extractor driven by a small gasoline engine for extracting the honey on the ground. Each year the hives are moved from the orange groves to the sage-covered mountain sides, and then to the blossoming lima-bean fields. This moving about increases the honey yield of 300 stands about 15 tons per year.

BEAUTIFUL WHITE FOX TRAPPED IN NORTH

This close-up view of a white fox in the far North was possible only because the handsome animal's foot was fast in the grip of a steel trap. As can be easily understood from this picture, hunters find these white creatures a most difficult mark against a background of glistening snow. The pelts are highly prized, the value of each being $20 or more.

White Fox, the Pelt of Which will Bring the Trapper About $20, Caught in a Trap

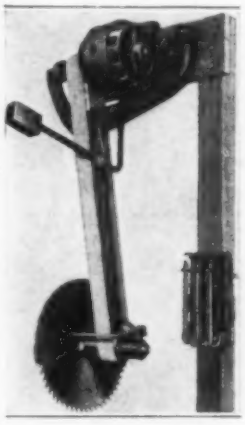
VALUE OF HAY CONSERVED IN METAL SHED

An all-metal hay shed, costing $2,000, is proving a good investment on a large farm, much of which is devoted to raising hay. The frame is of steel and the roof and gable ends are covered with sheet metal, making a fireproof structure. The progressive owner found his barns too small to hold his hay crop, while hay stacked in the open depreciated in value nearly 25 per cent, so he erected this shed. Besides keeping the hay in better condition, the shelter makes possible a saving of labor because located in the center of the hay field.

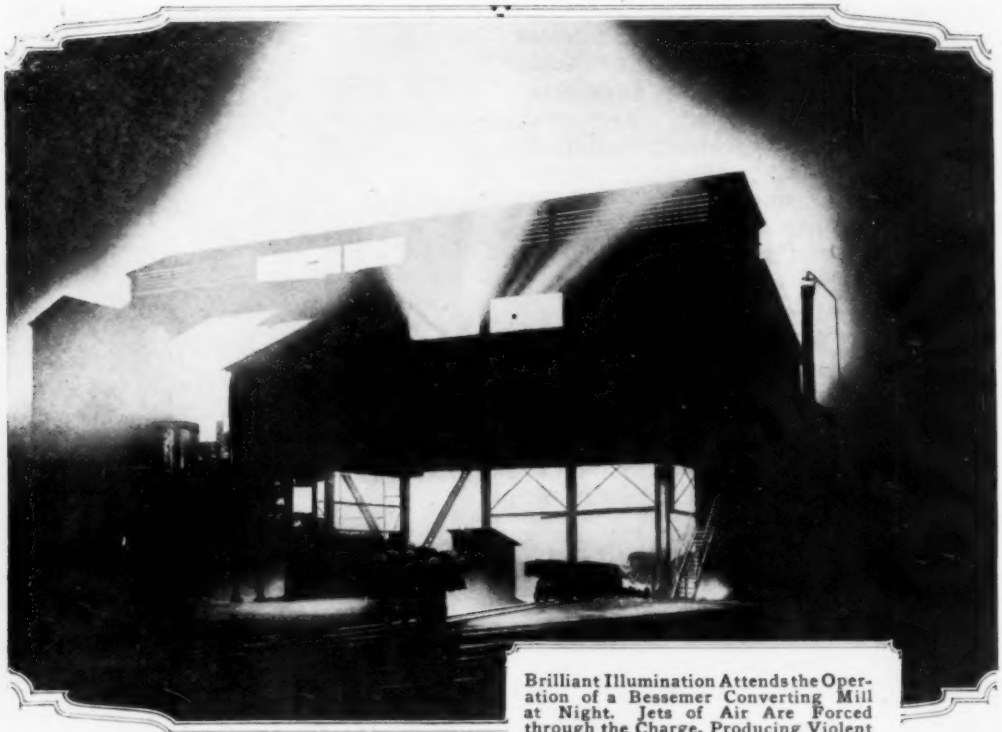
A $2,000 Metal Hay Shed Which is Proving a Good Investment by Preventing Deterioration of a Large Hay Crop

MOTOR-DRIVEN SWING SAW HELPS SHIPBUILDERS

One advantage of a new motor-driven swing saw, that is being widely introduced in shipyards and elsewhere, is that it can be quickly installed on any suitable overhead beam, right at the point where the work is in progress. The 10-hp. motor is mounted in the base, transmitting its power by a belt to a 36-in. saw at the end of a pivoted cast-iron arm. A weight automatically throws the saw back out of the way when it is released by the operator.



STRIKING GLIMPSES OF BIG STEEL MILL

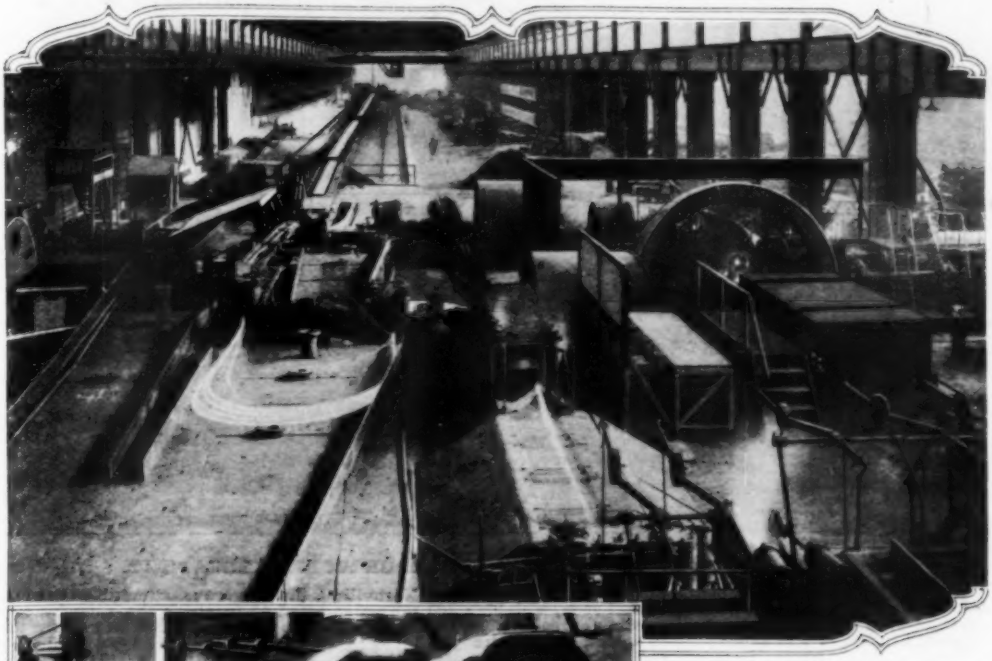


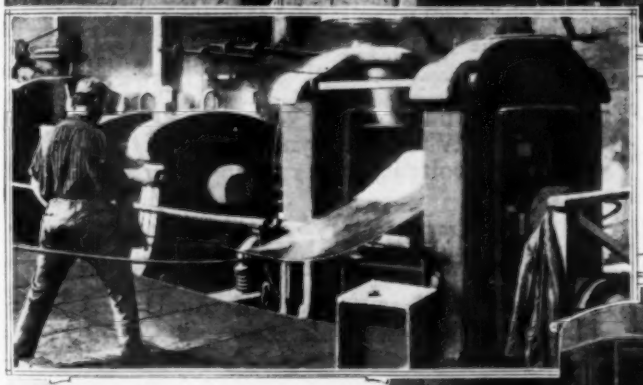
Brilliant Illumination Attends the Operation of a Bessemer Converting Mill at Night. Jets of Air Are Forced through the Charge, Producing Violent Combustion That Consumes All Impurities. To the Pure Iron Thus Obtained a Definite Amount of Spiegeleisen or Ferro-Manganese is Later Added

The Contents of the Converting Vessel are Emptied into a Traveling Ladle through a Nozzle, in the Bottom of Which the Hot Metal is Poured into Ingot Molds, as Shown Above. The Ingots, after being Removed and Reheated, are Rolled Down into Blooms

PHOTOS BY COURTESY OF THE

OPERATING AT FULL BLAST IN WARTIME





In the Course of Manufacture, Steel is Heated and Reheated, Rolled and Rerolled. After Ingots are Rolled Down in a Blooming Mill, the Blooms are in Turn Rolled into Rails, Beams, Rods, Plates, and Bars. Above Is a Bar Mill in Operation

The Picture Above is Nearly Self-Explanatory. Under Great Pressure, Steel is being Rolled into Thin Sheets, the Numerous Uses of Which Are Well-Known

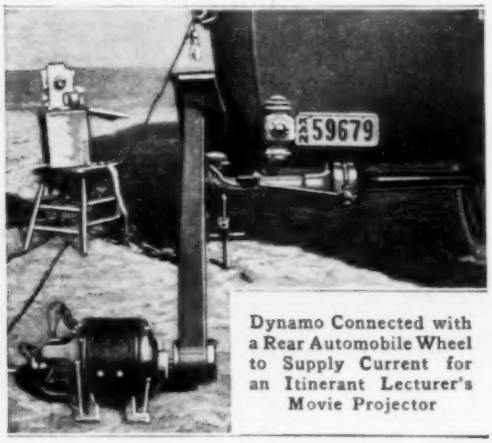
This Shows in Operation One of the Powerful Mills That Rolls Steel into Universal Plates, Which Are Finished Products of Variable Lengths Used in Bridge and Building Construction and for a Number of Other Purposes

BRIDGE HELD IN MID-AIR WHILE DREDGE WORKS BENEATH IT

DREDGING operations beneath a bridge of the Louisville & Nashville Railway were executed in an unusual way some days ago. The single steel span, weighing 100 tons, was lifted 45 ft. above the rails by two portable cranes stationed on the opposite approaches. While the bridge was thus suspended in mid-air the digging beneath it was accomplished with a 1¼-yd. dredge.

MOTOR CAR DRIVES DYNAMO FOR MOVIE PROJECTOR

A lecturer while visiting towns which cannot supply his motion-picture machine with electricity employs a portable dynamo which he operates by means of a belt run over a rear wheel of his automobile, the latter being first raised up on jacks. The current obtained is sufficient to throw a bright picture 50 ft. from the screen and supply several 30-watt lamps. When the dynamo is not in use it is bolted to the running board of the car



Dynamo Connected with a Rear Automobile Wheel to Supply Current for an Itinerant Lecturer's Movie Projector

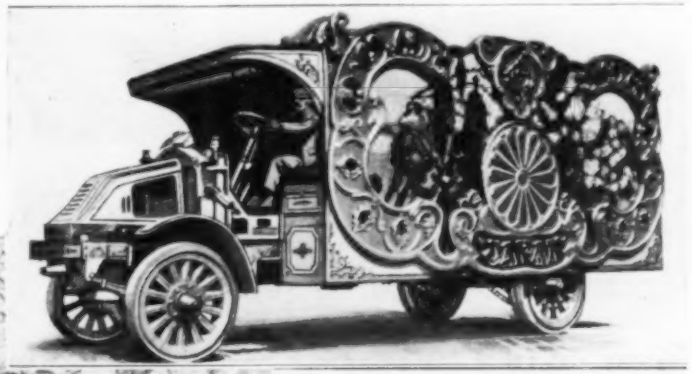
WANTED: A PRACTICAL WAY OF SALVAGING TWINE

Fiber experts of the United States food administration have placed a most difficult problem before the people of the country and have challenged them to find the solution. Heretofore, it seems, the best inventive genius of this and other countries has been baffled by it. The problem is the profitable salvage of the 300,000,000 pounds of binder twine, costing $75,000,000, used annually in the United States and Canada, in order to overcome the shortage that now exists. One firm of fiber merchants is advertising for suggestions and devices by which farmers and threshermen can save the twine from total loss. There is only about two feet of twine on each bundle of grain, worth about one-tenth of a cent, and the present method is to let it be cut up with the straw and be lost. The secondhand value of the bits of

cords would of course be even less, and yet if a way can be found to salvage these pieces a serious condition will be considerably relieved.

MODERN CIRCUS TRAVELS IN GORGEOUS TRUCKS

The old-fashioned circus that traveled from town to town in its gilded wagons and chariots now has a modern counterpart that apparently far surpasses it in dazzling equipment. Huge motor trucks have been transformed into circus conveyances more imposing than anything seen in days gone by. What is missing in the way of caparisoned horses is made up in speed and power. Quantities of gold leaf have been employed to make splendid the 150 motor trucks that will transport the new circus, serving as menagerie cars, sleeping cars, auto kitchens, repair cars, hospital cars, a truck equipped to drive and pull tent stakes, and cars of many other uses. This circus will be wholly independent of the railways, and, it is estimated, will save $1,000 per day in horse feed. A big truck with creeper treads will be provided to pull out any mired cars.



The Motorized Successor of the Old-Fashioned Circus Wagon: A Flamboyant Decoration Symbolical of Japan Adorns the Sides of This Truck

A Caravan That Makes the Circus Independent of the Railways: About 150 of These Vans will be Used in Moving, Sheltering, and Feeding the Circus Troupe

NEW AIR-DRIVEN PLANER SUPPLANTS HAND TOOL

An air-driven planer is now being employed in many shipyards, meeting the requirements of both a hand and stationary planer and proving espe-

Planing a Ship's Side with a Planer Having Cutting Knives Driven at High Speed by Compressed Air

cially valuable in planing ships' sides and timbers where stationary planers cannot be used. The cutter blades are driven by a turbine motor deriving its power from compressed air. The tool is not heavy and, being attached to a flexible air tube, can be moved about as desired. It is proving a big help in speeding up the building of wooden vessels.

SPRINGTIME ROAD MAKING AMID SNOWDRIFTS

For dwellers on the plains it is difficult to realize how long the mountains, particularly the northern slopes, remain

Springtime in the California Mountains: The First Team of the Season to Make Its Way to Dorrington and the Roadway That was Cut for It

in the grip of winter. The accompanying photograph, for example, was taken in mountainous east-central California late this spring, when the valleys and plains were already green. It shows the first team to make its way to Dorrington, Calif., this season, and the road cut for it through snow that was packed almost as hard as ice.

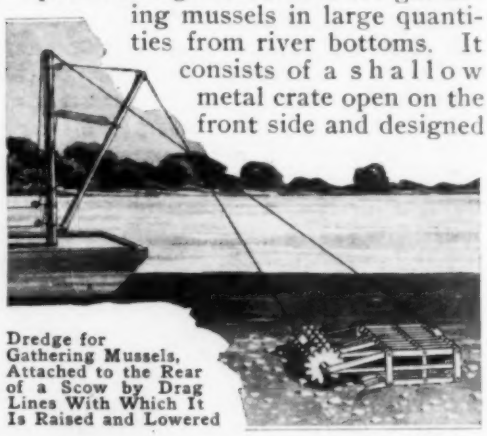
COMPACT GASOLINE STOVE FOR OUTINGS

Many desirable features have been combined in a new two-burner camp stove, contained in a neat metal case, the top of which can be removed and fastened to adjustable supports to form a base. The case measures 14½ in. long, 8 in. wide, and 3½ in. high. Gasoline is supplied from a small pressure tank that can be quickly attached to one end of the case. A small hand pump is provided for creating the necessary air pressure.

Handy Camp Stove That Burns Gasoline under Pressure: All the Parts can be Packed into the Metal Case When Not in Use

DREDGE FOR HARVESTING MUSSELS

Patents have recently been issued for a special dredge to be used for gathering mussels in large quantities from river bottoms. It consists of a shallow metal crate open on the front side and designed



Dredge for Gathering Mussels, Attached to the Rear of a Scow by Drag Lines With Which It Is Raised and Lowered

to be drawn by drag lines at the rear of a boat, the weight of the crate being sufficient to cause it to sink somewhat into the mud. The lower front edge of the crate is curved downward to scoop up the mussels as it moves along. A set of notched wheels mounted in front of the dredge enables it to override obstacles in its path.

¶Declaring that the present method of hatching lobsters is wrong in principle, Canadian authorities have closed some 14 lobster hatcheries on the coasts of the maritime provinces and will start an educational campaign to teach fishermen proper methods.

Desolation Wrought by the Fire: All Vegetation has been Killed by the Heat Below and the Ground has Sunken Several Feet

The Jets of Smoke Indicate That the Fire is Burning beneath This Concrete Road. There is Grave Danger That the Ground will Cave In

COAL FIRE UNDERMINES VAST AREA

By H. A. MOUNT

PROBABLY the greatest fire in the world is burning in southeastern Ohio. It has been burning for more than 30 years and has been fed by more than 15,000,000 tons of the finest soft coal in the United States. The fire has spread over about 18 square miles of territory, and has actually consumed about 1,500 acres of a coal vein that in places is 15 ft. in thickness, averaging 9½ ft. So far the fire has defied every effort to extinguish it and promises to be still burning a hundred years hence.

The fire lies between the little mining towns of New Straitsville and Shawnee, and covers, roughly, a territory 3½ miles wide by five miles long. Old Town, on a hill overlooking New Straitsville, is being gradually abandoned as the fire eats its way under the village. The water in many of the wells there is boiling hot and it is not an uncommon thing for a miniature volcano to burst forth in a back yard. Oil has been discovered in the district and wells have been successfully drilled through the fire by inclosing five pipes, one within the other, to keep the heat from the oil. In one or two instances, the heat has been so intense that the pipes were melted off. One can stand on a high hill in the middle of the fire district and see smoke issuing from the ground as far as the eye can reach in every direction. At night hundreds of red spots may be seen where the fire is burning at or near the surface. The coal vein that is burning is said by mining experts to be the finest vein in the Hocking Valley district, and perhaps the finest soft-coal vein in the United States. All big mining operations in the vein have ceased, but here and there small operators are working, always keeping just ahead of the fire, although the danger from black damp or explosions is great.

The Schoolhouse at Old Town Which had to be Abandoned: The Roaring Furnace Mouth in the Foreground Tells the Reason

The coal is covered with only from 10 to 100 ft. of earth and it is this fact that has made it impossible to check the fire. As the coal is burned out, the earth sinks, forming great cracks through which the blaze gets air. It has been found impossible to smother the fire, either by

Entrance to One of the Mines Where the Fire was Started

inclosing it or by using chemicals. In one of the early attempts to extinguish the fire, water was pumped on it continuously for three years without visible effect. Brick walls built through the coal in the path of the fire have proved equally ineffective. Today the fire burns unchecked, not only destroying millions of dollars worth of coal, but rendering hundreds of acres of land worthless. The fire was started simultaneously in seven big mines in the vein during the strike disturbances which occurred in 1884.

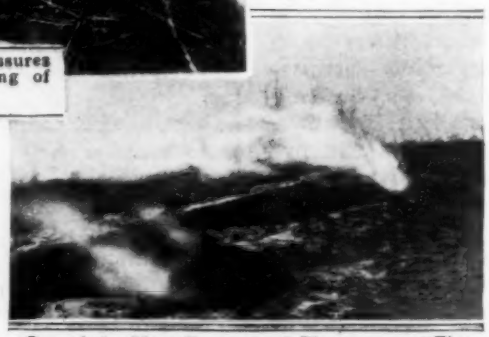
Miners Who Risked Their Lives in a Gallery Now Aflame

Smoke Issuing from Fissures Caused by the Sinking of the Earth

¶An important use has been found for coarse, grassy hay, which can often be raised where ordinary hay will not thrive. It is announced that 5,000,000 tons will be needed as a filler in making high explosives, the hay serving as a substitute for cotton.

RIVET-DRIVING CONTESTS EXCITE WIDE INTEREST

Rivet driving in the shipyards is becoming an exciting game that may rival baseball in national interest, as the months go by. Certainly the tremendously keen contests that have developed between various yards in recent weeks have a direct bearing on the war, for they are doing much to speed up vessel construction. On account of the variety of conditions under which rivets are driven, a committee was appointed to officially adopt a fair system of determining scores in the future. The best record announced up to the latter part of April was made by a riveter and his gang of helpers in a Baltimore shipyard, who drove 2,720 snap rivets in floors in nine hours. This was an average of 302 rivets per hour. Shortly after this achievement another gang drove 2,919 ¾-in. rivets in eight hours. No doubt, as in other branches of shipbuilding where speed records are being made, this showing will be surpassed.



One of the Most Pronounced Fissures on "Fire Hill," near Old Town: Clouds of Smoke Obscure the Valley Beyond

HOW WEST VIRGINIA MAKES ITS FUTURE FARMERS

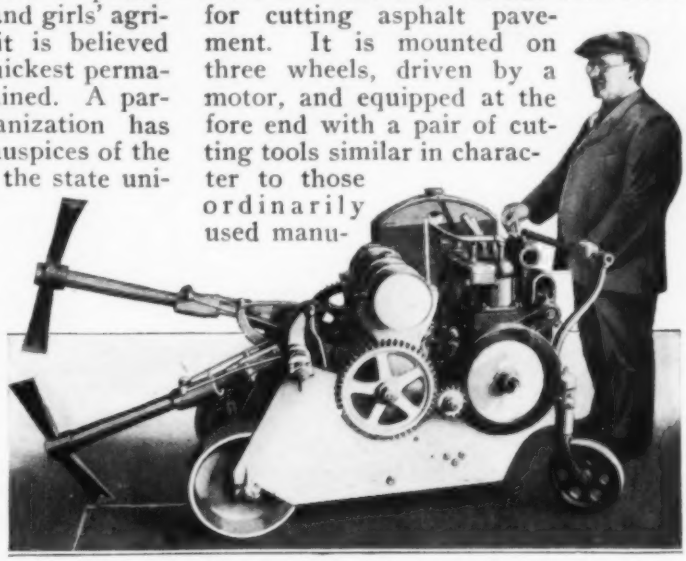
In seeking to improve farming methods in West Virginia special emphasis is being placed on boys' and girls' agricultural clubs because it is believed that through them the quickest permanent results can be obtained. A particularly thorough organization has been built up under the auspices of the extension department of the state university's college of agriculture. Boys and girls are enrolled in county and local clubs and engage in one or more contests such as raising corn, potatoes, pigs, poultry, or sheep. Certain rules must be followed by each member. In the first-year sheep contest, for example, each contestant must have two ewe lambs under his care and for a stated period must feed and handle them, prepare monthly statements of the weight, cost, and kind of feed used, and also prepare an illustrated booklet describing the work done. The lasting benefit which will result from such state-wide effort can scarcely be estimated.

NEW-STYLE SERVICE FLAG FOR MUNITION WORKERS

A large arms-manufacturing company, engaged in filling government contracts, has adopted a munition worker's service flag, one of which is presented to each employe. It has a white field surrounded by red, white, and blue stripes, with a medallion reproduced in the center. For every woman worker in the home displaying the flag, a red star is added, and for every male worker, a blue star is added. The central decoration is copied from a bronze piece presented by the company to each employe and bears this inscription: "War Service—Munitions Manufacture."

ASPHALT CUTTER DOES WORK OF SEVERAL LABORERS

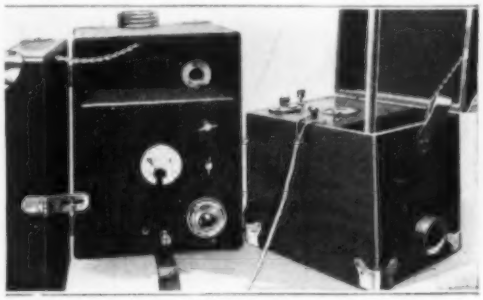
Of possible merit as a time and labor saver is a machine that has been built for cutting asphalt pavement. It is mounted on three wheels, driven by a motor, and equipped at the fore end with a pair of cutting tools similar in character to those ordinarily used manually for such work. The device is easily controlled by one operator and works at fair speed.



This Machine is Designed to Do at Moderate Cost the Hard, Tedious Work of Cutting Asphalt Pavement

SIMPLE BLASTING MACHINE IS POWER OPERATED

Those engaged in extensive blasting operations will perhaps be interested in a detonating apparatus that may be operated by steam or compressed air. It is composed of a 300-volt generator direct connected with a turbine. The



The Blasting Machine Is No More Expensive Than the Old-Style Manual Apparatus of Similar Capacity and may be Operated by Steam or Compressed Air

mechanism is housed in a case approximately a foot square, on top of which, protected by a cover, is the switchboard. An 80-lb. pressure is required to operate the motor at top speed and when thus working, the blasting machine is capable of firing 150 thirty-foot copper-wire fuses connected in series. It is claimed that the machine eliminates the chances of misfiring and the failure of charges to explode because of insufficient current for detonating the blasting cap.

RAISE FOOD EFFICIENTLY IN PANAMA CANAL ZONE

The Panama Canal Zone, for both patriotic and economic reasons, is undertaking to be wholly self-supporting in the matter of food. Since the zone was depopulated of natives in 1912 the land has lain idle except where enterprises connected with the canal are located. Now, over 30,000 acres of jungle have been cleared, fenced, and planted with the prolific guinea and Para grasses. Two dairy farms and a hog farm are in operation. Some 15 plantations, the products of which range from tropical foods to corn and garden truck, are being developed. On several plantations irrigation is carried on during the dry season, extending from January to May. A study is being made of the fish supply and steps are being taken to have an abundance of fish near at hand.

Under the Panama Railroad management, the commissioners are selling beef, pork, and poultry, killed at the abattoirs, at lower prices than in the United States. While milk and eggs are higher, the freshness of these local products makes up in part at least for the difference in cost. Cattle, hogs, and poultry are being brought in from nearby Central and South American countries in large numbers.

It has been found profitable to sublet some of the truck farms to Chinese gardeners on shares, one-third of the produce going to the government, while the commissary takes the rest

A Big Coconut Plantation in the Panama Canal Zone: Thousands of Acres of What Once Was Jungle have been Transformed during the Present Regime into Fertile Fields Which Make the District Self-Supporting in the Matter of Food

Richly Productive Fields on a Young Coconut Plantation: The Agricultural Activities in the Canal Zone, It is Hoped, will Stimulate Natives in Adjoining Territory to Utilize Land Similar to This, Which has been So Neglected That Food has to be Imported for the Inhabitants

at current prices. Much of the truck gardening is done between grapefruit, orange, coconut, avocado, and other fruit trees.

Not only are the civilian population, and the local army and navy forces, provisioned in the ways described, but all the ships passing through the canal are sold the provisions they desire.

It is hoped that what is being done in the zone will stimulate near neighbors to better farm methods. The Republic of Panama, for example, though sparsely populated, imports much of its foodstuffs.

NOVEL SHELTER IN CANAL ZONE FOR SMALL BOATS

An unusual type of boat shelter has been built at the water's edge in the Panama Canal for the use of small craft. The structure has a roof 80 ft. wide, upheld by cantilever trusses, which in turn are supported by two rows of concrete columns rising from a quay 25 ft. wide. The broad low roof projects approximately 57 ft. over the water. In addition to the weight of the shelter the trusses carry a trolley beam for a 5-ft. hoist, with which small boats are lifted from the water.

BULLETIN BOX AN AID TO SAFETY FIRST

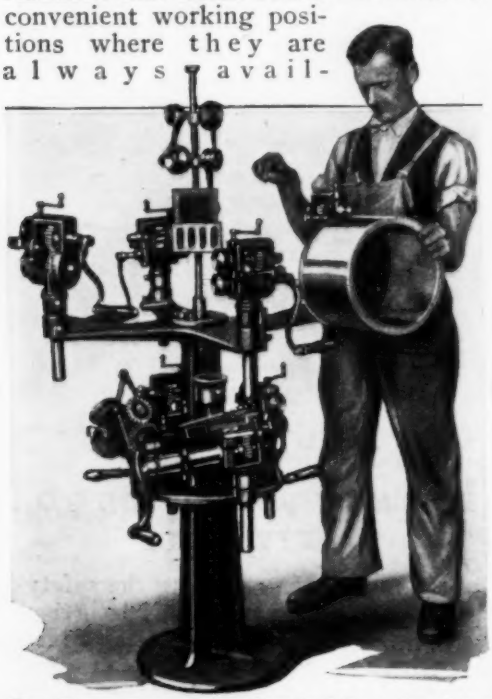
As a means of promoting the safety-first movement, a metal bulletin box is proving very effective. In the lid is a slot where suggestions can be dropped by employes, while lantern slides teaching safety-first lessons can be displayed, with the aid of a winking light, behind glass panels in front. On either side are glass panels for posting safety bulletins.

COURTESY OF THE SAFETY NEWS

Box Made to Receive Safety-First Suggestions: Transparencies can be Displayed in the Glass Panels in Front and Bulletins at Sides

SHOP EFFICIENCY IS AIDED BY BENCH-MACHINE HOLDER

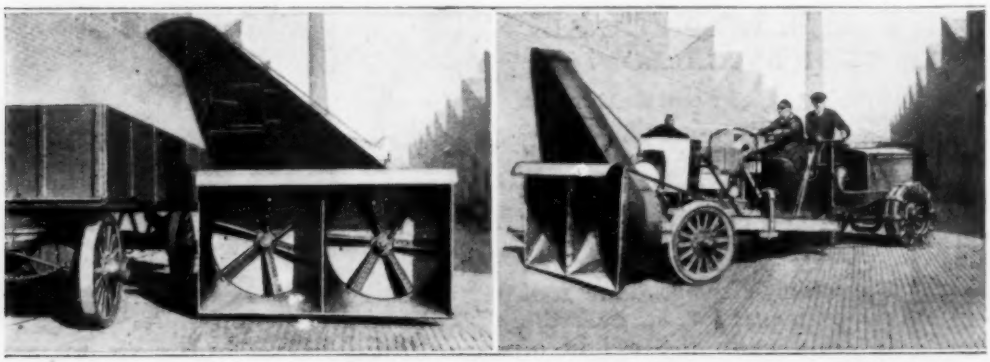
For tin and sheet-metal shops a standard that holds bench machines in convenient working positions where they are always available, without continually being in the way, has been developed. The upper part is supplied with a revolving turret that accommodates four machines. Immediately below it is a stationary turret of similar capacity. Machines held in the latter place are interchanged with those above as needed. Also there are two reserve posts supported on brackets to receive large machines. Each of the upper holders is adjustable to different heights. Four men can work around the standard at one time, or one man can use the various machines in turn without having to change his position.



The Upper Part of the Standard Is a Revolving Turret That Accommodates Four Machines. The Lower Part Is Stationary

POWERFUL ROTARY SNOW-PLOW FOR BOULEVARDS

The severe storms of last winter, with the unusually heavy snowfall, brought about the development, by the engineering department of the South Park Commissioners at Chicago, of a motor-driven snowplow of uncommon character. Two 40-in. rotary disks equipped with curved blades are mounted within a scoop-shaped metal housing that is 7 ft. wide and 4 ft. high. Snow is carried through an inclined chute that extends about 7 ft. above the pavement and is fitted with a diverter, so as to discharge at any required angle or into wagons if desired. The device, including a 38-hp. motor that operates it at a speed of about 400 revolutions a minute, is mounted on a wood frame, balanced on a truck axle and coupled at the rear to a three-wheel tractor. Two men operate the combination, one controlling the plow and the other the tractor.



Left: Showing the Chute in Position to Discharge Snow into a Wagon Alongside. The Rotary Disks are Operated at a Speed of Approximately 400 Revolutions a Minute. Right: Side View of the Combination, Illustrating How the Plow and Tractor are Coupled. The Two Machines are Controlled Separately, and an Operator is Required for Each

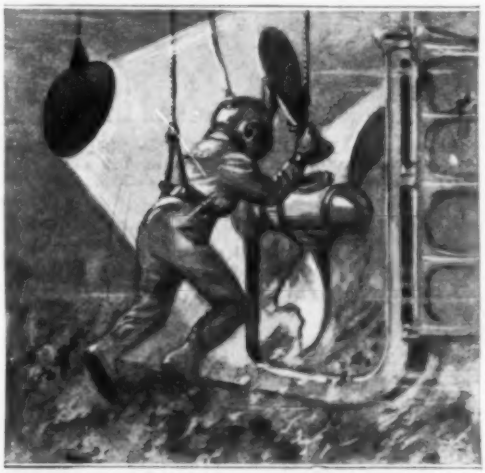
The $150,000 Natatorium Recently Completed at Asbury Park, New Jersey: Hot and Cold Sea Baths, a Large Swimming Pool, and a Sun Parlor Are Features of This Structure

VARIED BATH FACILITIES IN MODERN NATATORIUM

The new natatorium that has been completed in Asbury Park, N. J., to take the place of one that burned down a year ago, is a splendid fireproof structure of marble and other stone, costing $150,000. The lower floor is occupied by a lobby and swimming pool, while upstairs are hot and cold sea-water baths, and a large sun parlor overlooking the board walk. Stores occupy the first floor, fronting the walk.

FERRY CARRIES FACILITIES FOR REPAIRS AT NIGHT

Occasionally it happens that the motor ferry, "Miss Vanderberg," breaks a propeller while battling heavy ice during its daily trips in the wintertime between Prescott, Ont., and Ogdensburg, N. Y. Such a mishap does not prevent it from making port under its own power, for it is a double-end vessel and able to proceed with one engine. When it puts in at its berth at midnight, however, hurried repairs are made so that it can start on schedule at 5 o'clock in the morning in shipshape condition. Accordingly, powerful incandescent lamps fitted in large, water-tight reflectors, carried aboard for the purpose, are lowered to a depth of about six feet below the surface of the water on either side of the ferry to supply illumination for a diver who carries out the necessary work.



Aided by Incandescent Lamps Held in Water-Tight Reflectors, the Diver Repairs the Damaged Propeller between the Time of the Vessel's Midnight Arrival and Early-Morning Departure

DOUBLE PILE DRIVER MADE TO MEET UNUSUAL NEED

In strengthening its long trestle across Great Salt Lake with new piles, the Southern Pacific Railroad found it impractical to use an ordinary pile driver mounted on a flat car, because it interfered with traffic. To meet the

special requirements, a high framework was built straddling the trestle and provided with an elevated operating

Double Steam Pile Driver Built So That It Does Not Interfere with the Operation of Trains on the Trestle Which is being Reinforced with Extra Piles

platform, under which trains could pass. It is essentially a double steam pile driver, one driver being located at either side. It rests on wheels that run on the edge of the trestle, and so can be moved along as the work progresses.

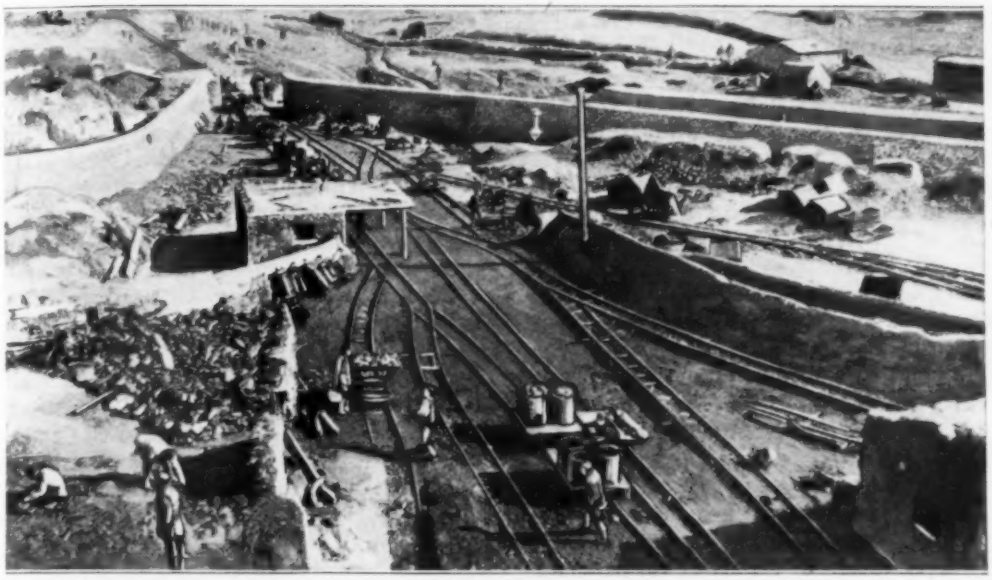
NEW PHONOGRAPH RECORDS EARTHQUAKE SOUNDS

One of the newest uses to which the phonograph is being put is in recording and reproducing the subterranean sounds of earthquakes. Obviously such records are not primarily for parlor reproduction but rather an aid to scientific research. The originator of the new recording process, which is now being perfected, employs old-fashioned cylindrical wax records that are very sensitive, and an improved microphone, together with a very light field outfit.

DODGING DEATH IN FAMOUS RAPIDS IN YUKON

The photograph below shows a crew of nine men—eight at the big sweeps and their captain—playing the game of dodging death. A wrong move or a moment of indecision on the part of the captain, who gives all commands, and the big craft will go on half-hidden rocks, while crew and cargo will be engulfed. This picture was taken in the famous Whitehorse Rapids in the Yukon. Several hours' time is occupied in shooting these turbulent waters, and during the ordeal no one save the captain is allowed to speak, lest disaster result from distracted attention.

Shooting the Perilous Whitehorse Rapids in the Yukon: A Raft Manned by a Crew of Nine being Carried Along by the Swift Waters Which may at Any Moment Dash the Craft on a Hidden Rock. So Important Is It That Every Man Concentrate on Steering the Raft That No One is Allowed to Speak except the Captain



By Combining American Skill with Chinese Knowledge and Capital, One American Firm with Collieries in the Hard-Coal Belt has Developed Its Properties to a Daily Output of 3,000 Tons

VAST COAL AND OIL WEALTH UNTOUCHED IN CHINA

By FRANCIS H. WILLIAMS

The development of the hard and soft-coal deposits and the oil resources of China, together with the coördination of production, offers one of the greatest industrial and engineering opportunities in the world. The future of manufacturing in China depends on power and raw material. Of the latter, there is an abundance, and of coal, enough to supply the world for centuries, it is estimated.

The development of these great coal fields depends largely on railway facilities. Unfortunately not more than one or two American railway men have attempted to develop any comprehensive railroad plans for this vast country. One large American corporation, with headquarters in Peking and Shanghai, has recognized that in a few years China will be making up her own raw materials into finished products, and this concern is seeking to develop rail lines, plants, etc., accordingly. However, up to the present time this corporation has not interested itself in coal, no doubt on account of the railroad situation.

At present, competition is such that the marketing of coal in China is scarcely profitable. What should be done is to organize several small companies into large concerns and by working in combination the coal could be marketed at a profit, instead of at a loss. One American concern located at Peking, with collieries in the hard-coal belt, has demonstrated that this can be done and has developed its properties to the point where the daily output is 3,000 tons. Within a short time it should dominate the coal market of the province of Chili.

One reason this company has succeeded, though starting with small capital, is that it combined Chinese knowledge and money with American skill. Most of the improvements have been paid for out of the profits, and the concern's credit now is excellent. All underground work at the mine and the delivery of the coal to the railway terminal is done on contract. No trouble is experienced in getting all the miners necessary at 20 cents a day. What has been done here with the

guidance of American engineers can be done in thousands of other mines in China, coal and mineral as well.

Surprising as it may seem, the chief business of the large oil interests in China is in candles and not in the development of oil wells. Oil has been found in many regions and at various points is produced and refined by crude native methods. One Chinese company has erected a refinery near Yenchang and is now competing with foreign companies.

The large American oil interests have given up their arrangement with the Chinese government, having permitted their options to expire. They offered to make a survey of the whole country's oil resources if they would be allowed to monopolize the refining and transportation of all crude-oil products, and have an exclusive right to certain localities. This offer the government declined.

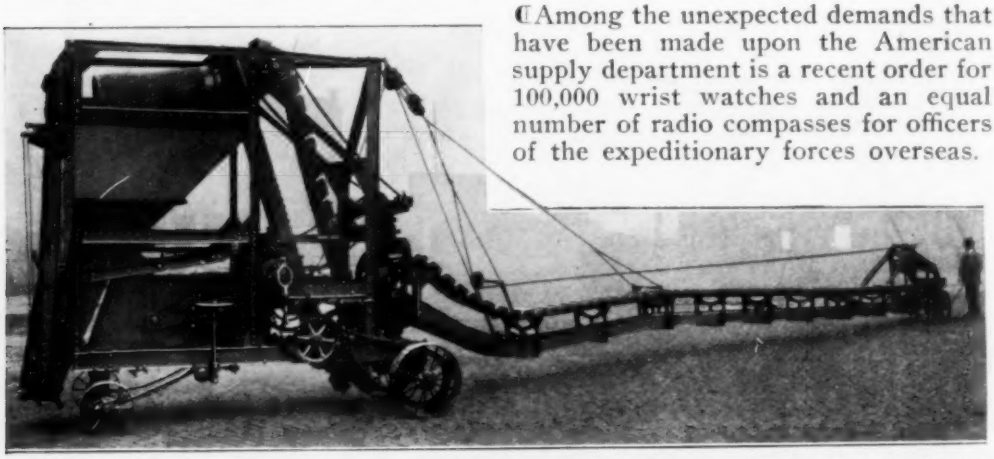
CONCRETE MIXING OUTFIT SAVES MUCH LABOR

For conveying, measuring, and mixing concrete aggregates, a machine has been developed that reduces by two-thirds the manual labor usually involved in such operations. In part it consists of a conveyor into which sand and stone are shoveled from ground storage piles and carried to an elevator that discharges into a rotary screen. The latter separates the material, which then falls into segregated bins. Below these there is a measuring bin with two compartments that may be regulated to deal out the sand and stone in whatever proportions are desired. It is hinged so that when swung outwardly its door automatically opens, discharging the measured materials into the mixer. Cement is then introduced manually. The conveying mechanism extends 50 ft. ahead of the mixer, alongside the storage piles, and thereby eliminates wheeling. Its outer end is carried on a truck and the middle part supported by cables when the outfit is moved under its own power.

OIL TANK OF CONCRETE INSTEAD OF STEEL

Owing to the present high cost of steel plates and the difficulty of securing them, a fuel-oil storage tank in the Panama Canal Zone has been built of concrete, instead of the metal, as is usual. The tank, which is entirely above ground, is 115 ft. in diameter, 30 ft. deep, and has a capacity of 55,000 bbl. In addition to its low cost, a big oil container of this type has the advantage of permitting a small loss of oil through evaporation. The roof of the tank is of wooden construction.

¶Among the unexpected demands that have been made upon the American supply department is a recent order for 100,000 wrist watches and an equal number of radio compasses for officers of the expeditionary forces overseas.



The Machine Conveys, Loads, Measures, and Mixes Concrete Aggregates. This View Shows It with the Conveyor Raised above the Ground to Permit Transportation of the Unit

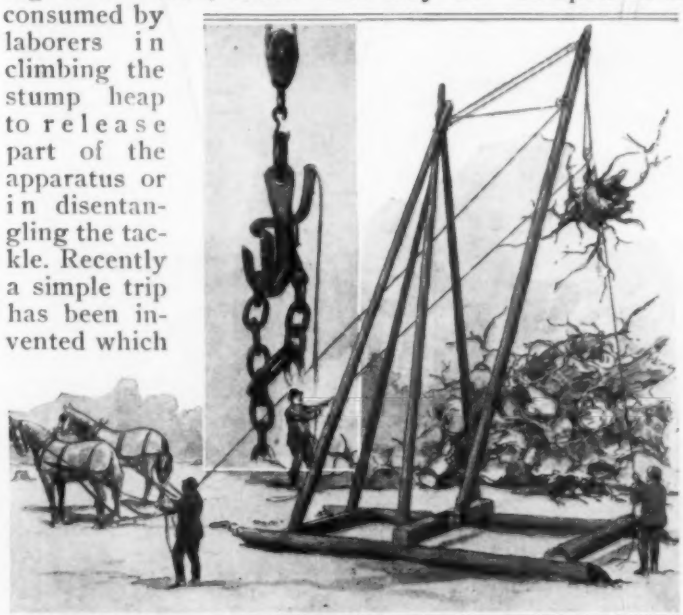
DRIVING ATTACHMENT HELPS CAR THROUGH DEEP SAND

Deep sand and quagmires are not to the liking of motorists, but it often occurs that they must be traversed. Desert hauling is one instance of this. To meet conditions presented by the latter problem, a queer tractorlike attachment has of late been subjected to tests in California sand dunes. The rear wheels of a car are replaced with driving pinions that float on internal spur gears within a pair of broad-tired bull wheels. When power is applied, the pinions begin to climb so that the combined weight of the rear part of the car and the load it carries is used to turn the bull wheels forward or backward as the case may be.

The Sand-Navigating Attachment is Shown Applied to a Light Runabout Used during Experiments Conducted in the Sand Dunes of California. Its Principle Makes It Distinct from Tractor Devices of Similar Appearance

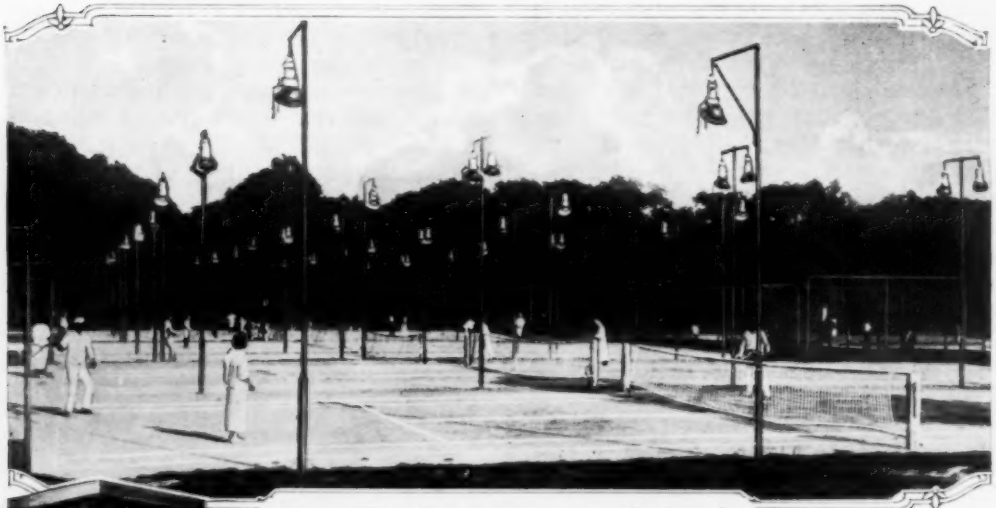
IMPROVED HOOK FOR USE IN PILING STUMPS

In piling stumps gathered by clearing timber land, much time may be consumed by laborers in climbing the stump heap to release part of the apparatus or in disentangling the tackle. Recently a simple trip has been invented which overcomes this difficulty by enabling an operator standing on the ground to release a hoisted load at will. The hook used is provided with a chain that is bound about the stump to be lifted. One end is permanently attached to the tripping apparatus and the other engages a pivoted grabhook which is kept in position by a spring-held pawl. The chain can be released from the grabhook whenever desired by merely pulling a rope attached to the pawl. There are many kinds of work besides stump piling in which this device can be used to advantage. Because of the simplicity of its construction there is little about it to get out of order.

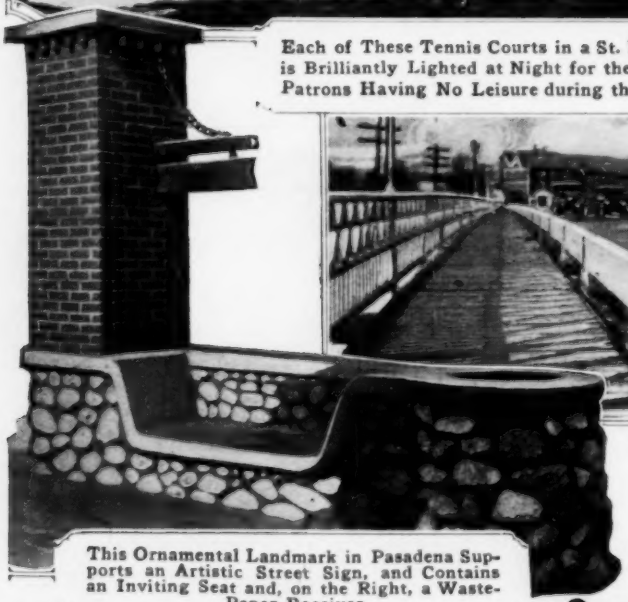


Improved Grabhook Used in Piling Stumps, Which Enables a Laborer to Release a Hoisted Load Merely by Pulling the Rope Attached to the Trip

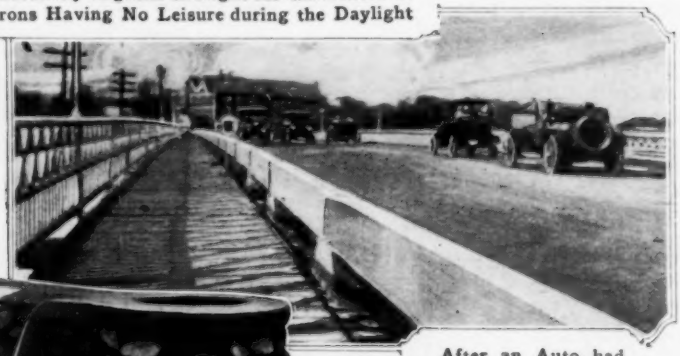
CIVIC FEATURES THAT PROMOTE THE COMFORT



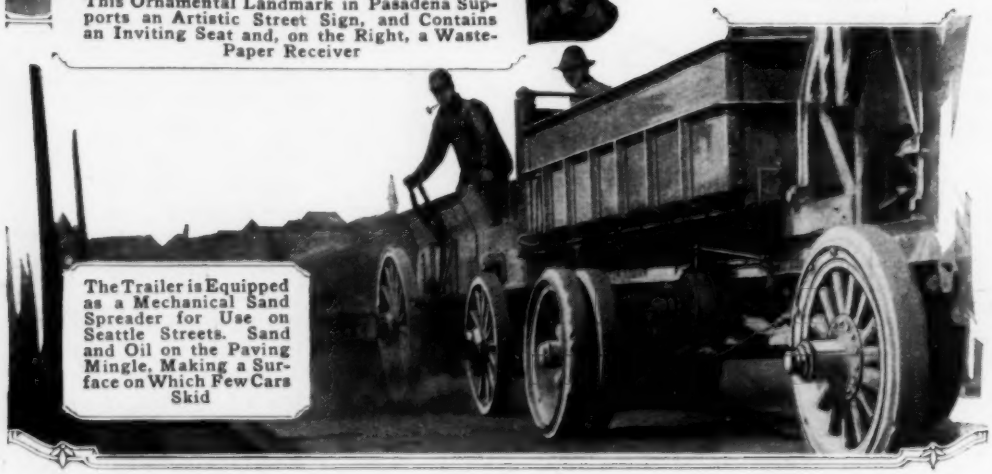
Each of These Tennis Courts in a St. Louis Park is Brilliantly Lighted at Night for the Benefit of Patrons Having No Leisure during the Daylight



This Ornamental Landmark in Pasadena Supports an Artistic Street Sign, and Contains an Inviting Seat and, on the Right, a Waste-Paper Receiver



After an Auto had Plunged from This Bridge into the River Below, the Very Heavy Guard Rail Shown at the Left of the Walk was Erected as a Safety Measure



The Trailer is Equipped as a Mechanical Sand Spreader for Use on Seattle Streets. Sand and Oil on the Paving Mingle, Making a Surface on Which Few Cars Skid

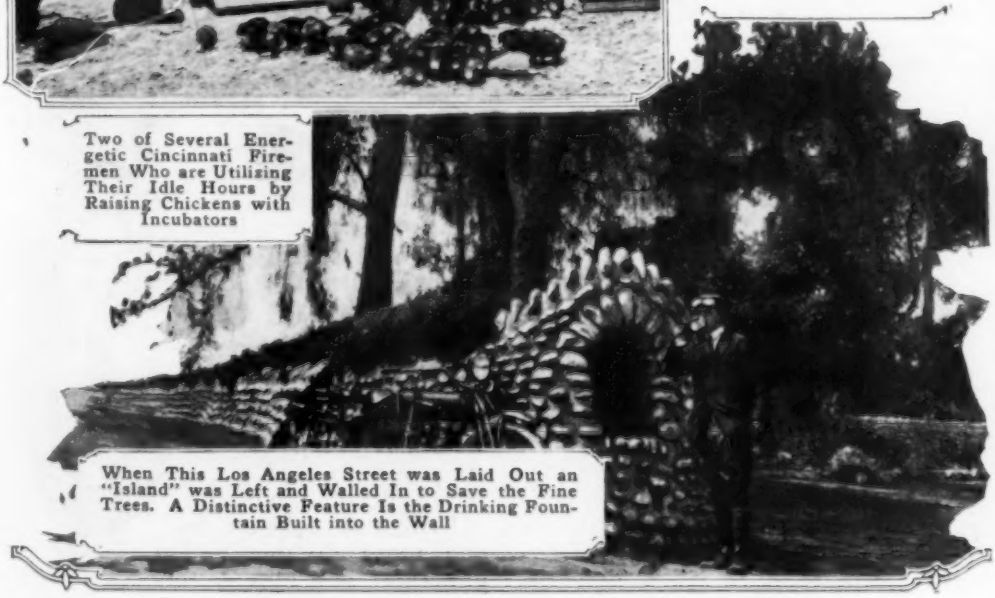
AND ENJOYMENT OF RESIDENTS AND VISITORS

A Pleasing Structure Some 30 Miles from Visalia, California, That Shelters a Mail Box Close by a Mountain Road

In New York This Notice is Posted before Paving is Laid to Hasten the Making of Pipe Connections and So Avoid Tearing Up the Street Later

For a Busy Town or City a Post Office Finished Off as Above would, of Course, Be Quite Out of Place, but in Southern California Mountains the Rustic Structure is Very Appropriate and Pleasing

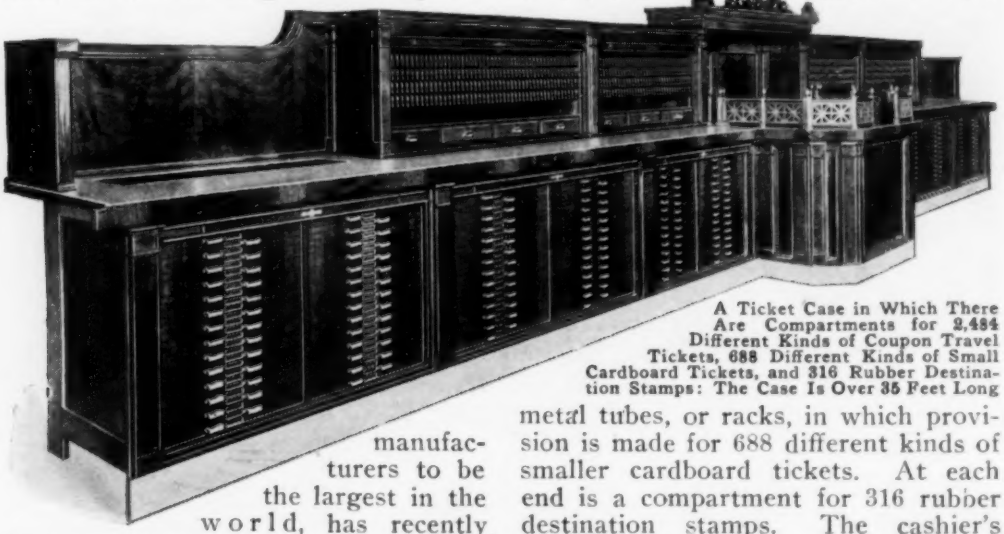
Two of Several Energetic Cincinnati Firemen Who are Utilizing Their Idle Hours by Raising Chickens with Incubators



When This Los Angeles Street was Laid Out an "Island" was Left and Walled In to Save the Fine Trees. A Distinctive Feature Is the Drinking Fountain Built into the Wall

LARGEST TICKET CASE JUST COMPLETED

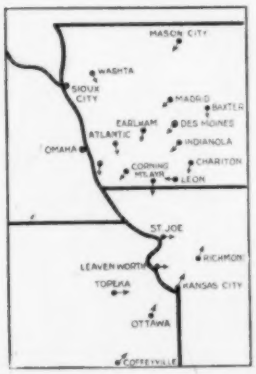
A handsome walnut-finish ticket case, 35 ft. 5 in. long, claimed by the manufacturers to be the largest in the world, has recently been completed for the travel department of an express company in New York City. It has a total capacity for 2,484 different kinds of coupon tickets in channeled drawers occupying seven sections beneath the long counter, while above it are metal tubes, or racks, in which provision is made for 688 different kinds of smaller cardboard tickets. At each end is a compartment for 316 rubber destination stamps. The cashier's recess occupies the center of the long fixture.



A Ticket Case in Which There Are Compartments for 2,484 Different Kinds of Coupon Travel Tickets, 688 Different Kinds of Small Cardboard Tickets, and 316 Rubber Destination Stamps: The Case Is Over 35 Feet Long

PATH OF METEOR TRACED ACROSS THREE STATES

A brilliant meteor having attracted much attention in Iowa, Nebraska, Kansas, and Missouri, on the night of January 22, an astronomy professor undertook the task of "running down" the heavenly visitor. What would seem to the layman an impossible feat did not prove difficult for the scientist. Reports were collected from some 30 cities and a map was prepared, with arrows indicating the direction in which the meteor appeared to observers in the various towns. The general direction of its travel was from north to south. A fragment is said to have fallen near St. Joseph, Mo. The report from Coffeyville, Kan., the southernmost point heard from, stated that the meteor seemed to strike "just north of town with such force that windows rattled."



INSIDE REINFORCING ARMOR FOR AUTOMOBILE TIRES

To increase the life of a motor-car tire, a reinforcing lining, made of vulcanized layers of fabric shaped to fit the inside of a casing, is coming into use. Its outer surface is coated with an adhesive preparation that cements it in place so that it will not slip or wrinkle. It is supposed to add materially to the life of an old tire and make a new one more durable and resistant to punctures and blow-outs.

GREAT LAKES SHIP LINE TO RELIEVE RAILWAYS

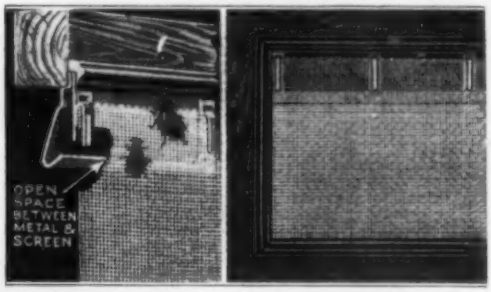
Seven large, modern, electric-lighted steamships have been assigned to service between Chicago, Milwaukee, and Buffalo by the United States railroad administration, to relieve rail congestion of freight. Before the summer has progressed far it is expected this water service will have released many cars for use in the West that were long tied up in the central district. All-rail rates will prevail in both directions. Day and night shifts will be employed at terminals to reduce delay to a minimum.

BREECHES AND FUDGE APRON WOMEN'S FARMING COSTUME

Breeches that are a slight modification of those belonging to the conservative feminine riding habit, and a less-than-knee-length panel apron that has two large pockets and is belted at the waist, constitute part of a sensible and serviceable farming costume which has been designed for women war workers in fields and gardens. The garments are worn with puttees and a plain, loose-fitting shirt. Attactiveness, always an essential of feminine attire, is present in the form of practicality rather than conspicuousness.

IMPROVED SCREEN EXPELS FLIES FROM ROOM

A simple attachment for a screen has been most successful, it is said, in expelling flies from a room. A slot is made in the upper edge of the screen and behind it a metal strip is fastened having its lower edge turned up to form a trough. This is placed so as to leave only a narrow slot between it and

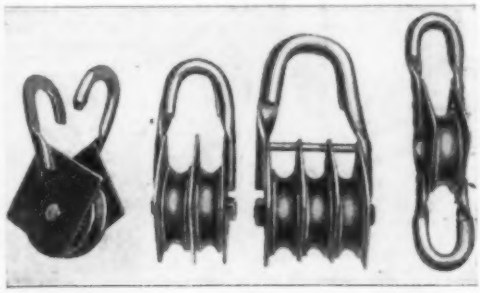


On the Upper Edge of This Screen Is a Trap That Expels Flies from the Room. The Diagram Shows a Cross Section of the Trap

the netting. It is well known that flies almost always climb upward and fly downward, and so when they alight on this screen they eventually crawl into the trap. Then, rather than turn and crawl down, they crawl out. If a fly enters the trap from the outside it finds the lower slot too narrow to fly through and so eventually crawls out where it entered.

LOW-PRICED SNATCH BLOCK THREADS QUICKLY

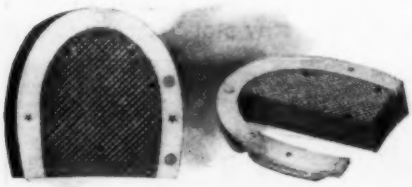
A new and inexpensive snatch block is a timesaver in any sort of work where a rope or cable has to be frequently threaded onto a pulley or removed from it. The hook—of the type called sister hook, used for many purposes on sailing boats and vessels—is



Four Types of Pulleys, Each with a Hook That Opens as Shown at the Left So That It can be Threaded Quickly

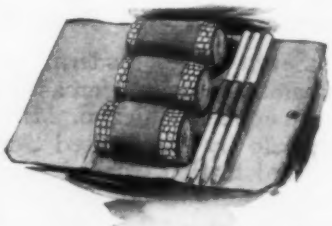
composed of two overlapping halves that can be spread apart to allow the rope to be dropped into place.

SOME NOVEL AND LITTLE-KNOWN ACCESSORIES



Although Primarily Intended for Army Purposes, This Iron-Clad Rubber Heel Is One That may Appeal to Civilians

This Caster, Intended for Kitchen Furniture, is Supplied with a Trough Which, When Filled with Oil, Forms a Trap for Insects



For the Soldier: A Khaki Case Containing Three Cob Pipes. Price 75 cents

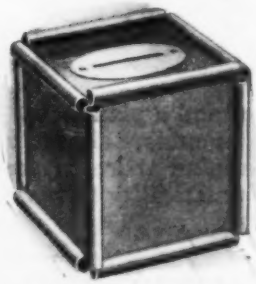
For the Débutante's Dressing Table: An Ornamental Powder-Puff Holder Made of Iridescent Opaque Glass and Decorated with Varicolored Fruits and Flowers. Price $1.50

Shaving Kit for Trench Use, Composed of Safety Razor, Electric-Lamp Attachment for Handle, Stropper, Trench Mirror, and Khaki Case. Price $5

A Reversible Soft Cuff for Men's Shirts Which Provides a Sleeve of Adjustable Length, to Suit Office and Street Wear

Air-Tight and Dust-Proof Refrigerator That may be Rigidly Attached to the Running Board of a Touring Car in a Moment's Time. Price $12.50

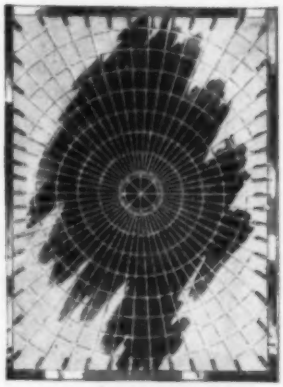
Snug-Fitting Paper Vest Lined with Cambric and Covered with Olive-Drab Sateen: It Is Proof against Cutting Winds. Price $3



Steel Puzzle Bank Securely Held Together by Peculiar Form of Construction That Prevents It from being Opened without Instructions

Cold Air Admitted Above the Burner Passes Across to the Right Side, then Up and Rearward to the Outlet, Aiding Combustion and Distributing the Heat Evenly in the Oven

The Clamp Holds the Lids of Four Cans Firmly in Place While They are being Sealed, and Obviates the Danger of Burned Fingers. Price 65 Cents



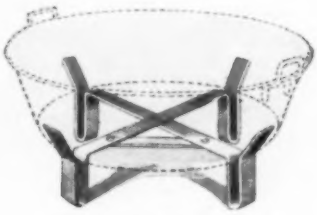
In Constructing a New Nonsagging Bed Spring, a Pattern has been Evolved That Closely Resembles a Cobweb. Price $10

Adapted for Women's Apparel: An Ironing Board with Sleeve Board, Sponge Cup, Pad-Holding Attachments, and Gas Heater for Iron. Price $18

When Worn as Shown, the Tatting Hook Enables a Thread to be Drawn Quickly and with Ease through a Picot Made Smaller than Is Usually Permissible

The Ladderlike Rack Holds a Half Dozen Ash Trays Finished in Delicately Tinted and Highly Glazed Enamel. Price about $9

Decorated China Cake and Sandwich Tray with Basket Handle of Reed Price $1.50



With the Folding Base, a Dishpan is Held at a Convenient Height When Used in a Kitchen Sink. Price 30 Cents

SEPARATE CRANK MECHANISM FOR MOVIE CAMERA

To overcome vibrations due to irregularities of motion in manually cranking a movie camera, a new driving mechanism has been

For Rapid-Fire Movie Work: The Separate Driving Mechanism Leaves the Operator Free to Swing the Camera on Its One Leg Quickly to Any Necessary Position

developed. Instead of being incorporated in the camera housing, it is installed on a separate tripod and connected with the instrument by a flexible shaft. While such an arrangement makes it necessary for the operator to employ an assistant, it has the possible merit of facilitating rapid-fire work. This is expedited by eliminating the conventional tripod and equipping the camera with a single leg which rests on a pivoting base. Since the operator has both hands free to grasp handles on the right and left sides of the camera, it is possible for him to swing the instrument to any required position almost instantly.

¶As an economy measure the Chicago Telephone Company has discontinued the practice of giving the correct time to inquirers, thereby eliminating no less than 250,000 calls a day.

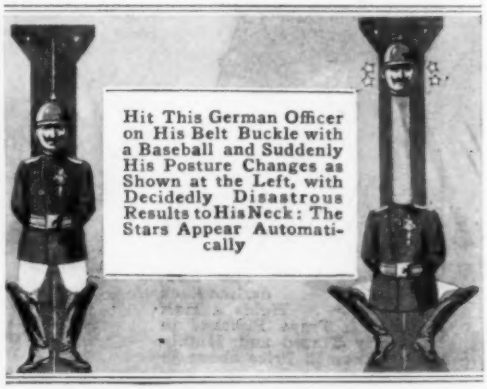
SAVES TIME PLOWING HILL FROM TOP DOWN

A farmer in the Ohio Valley who owns a tractor plow is following an original plan in tilling a very steep cone-shaped hill on his farm. Instead of starting at the bottom and working toward the top, as is a common practice, this man drives his tractor to the summit and then plows in circles around the hill, working his way toward the bottom and throwing the furrow up the slope, instead of down. More work can be accomplished in a day by this plan, the farmer has found, because of the saving of power in descending the hill.

To guard against washing away of the soil, only oats or wheat are sown, and at the same time the ground is planted with clover, a double amount of seed being used. This leaves a heavy sod that resists erosion and is allowed to remain for a few seasons before being plowed under.

NEW BALL-THROWING GAME A BY-PRODUCT OF WAR

The apparatus employed in a new ball-throwing game reflecting war-time emotions, is a life-sized figure of a German officer standing on a gallows, a noose about his neck. Hitting the belt buckle of the figure with a ball causes the knees to bend while the head is jerked upward, stretching the neck about three feet. At the same time stars appear either side of the head.



Hit This German Officer on His Belt Buckle with a Baseball and Suddenly His Posture Changes as Shown at the Left, with Decidedly Disastrous Results to His Neck: The Stars Appear Automatically

SUBTERRANEAN RIFLE RANGE FOR HIGH-SCHOOL CADETS

High-school cadets at Merced, Calif., have an underground rifle range that enables them to hold target practice day or night in a thickly populated district without danger. The plan is one that might be utilized to advantage elsewhere by similar organizations. The range consists of a 150-ft. tunnel with an illuminated target, backed by a mound of earth, at the far end. It connects with a firing pit of sufficient size to accommodate a number of persons. The tunnel is uncovered for a distance of a few feet in front of the target. This arrangement provides illumination in the daytime and gives the scorer a close-up view. The tunnel is two feet square and about four above the floor of the firing pit. Lights are arranged to illumine the front and rear sights of a rifle held in firing position.

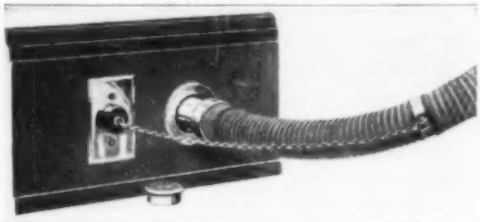
Practice with High-Power Rifles may be Conducted with Absolute Safety in Thickly Populated Districts If the Plan Suggested Herewith is Adopted. The Underground Range is Used by Cadets at a California High School and is Equipped for Daytime and Night Shooting

CONVENIENT ART TABLE HAS THREE LOCKERS

For the school or studio having limited space, which must be utilized by a considerable number of artists, the art table shown herewith is particularly suitable. It stands 30 in. high, and the top can be adjusted to an almost vertical position for sketching, charcoal, and water-color work. The three lockers can be assigned to as many different persons using the table at different times, to hold smaller boards, portfolios, etc. The small drawer can be used to hold instruments, water colors, and the like, by the person using the desk.

NEW AUTOMATIC FEATURE FOR VACUUM CLEANERS

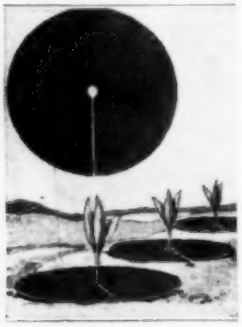
An automatic control for stationary vacuum cleaners is provided by a wall receptacle, the cap, or plug, of which is attached to the cleaner hose by a chain. When the hose is removed from its socket the cap is necessarily withdrawn also, automatically cutting off the current for the motor. This arrangement is preferable to a system having many switches, each of which must be turned off.



When This Vacuum-Cleaner Hose is Removed from Its Wall Socket the Attached Plug is Pulled Out Also, Automatically Cutting Off the Current

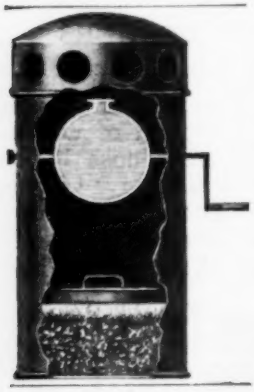
DISKS OF TARRED FELT TO PROTECT CABBAGE

Vegetable growers are protecting their early cabbage and cauliflower plants against maggots by placing especially prepared 3-in. disks of tarred felt paper about their stems soon after planting. Each has a hole in the center and a slit extending to it so that the shield can be easily slipped into position. The tar felt used is one-ply and will not curl in the sun, but lies flat so that no eggs can be laid close to the plant.



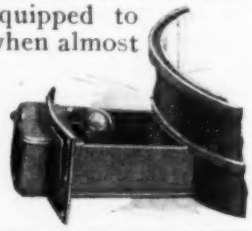
SMOKE-PRODUCING DEVICES USED IN FIELD BY HUNS

To prevent enemy observation of troop movements and other activities of military importance, smoke screens are being widely used in the fighting along the western front. To produce them the Germans are employing three devices that are much alike in type but different in size. They are known as the smoke drum, the smoke box, and the smoke top. The latter, the favored apparatus, is cylindrical, about three feet high, a trifle more than a foot in diameter, and weighs about 150 lb. It is supplied with carrying handles and an operating crank. The cover, perforated around the edge, is screwed in place. Inside, and connected with the crankshaft, there is a spherical iron receptacle filled with liquid chemicals and closed by a screw cap. Quicklime is contained in a covered iron box fitted in the bottom of the cylinder. To operate the device the cover of the lime box is removed, the cap of the spherical container unscrewed, and the crank turned so that the contents of the latter receptacle drain out into the lime. Approximately 40 lb. of lime and 13 qt. of liquid chemicals are used. Smoke immediately begins to issue through the perforations in the cover. The smoke drum, previously mentioned, weighs about 210 lb., and the smoke box 118 lb. Both are similar in construction and operation to the smoke top.



WATER PAN FOR FURNACE FILLS AUTOMATICALLY

An extra-large water pan is now being installed in furnaces of a certain make which is equipped to fill automatically when almost empty. The pan holds 7 gal., and one end makes a contact with the fire pot so that evaporation is very rapid. Water is supplied through a pipe, the flow being governed by a float-controlled valve.



GAUZE FACE MASK FOR USE IN HOSPITALS

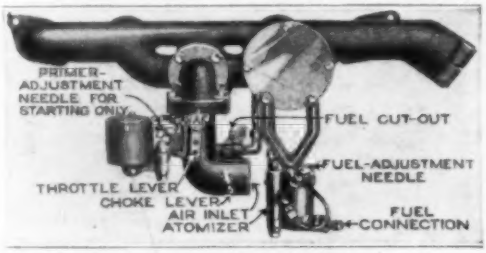
A face mask that can be easily kept in position has been designed for use by contagious-disease attendants in army hospitals and elsewhere. It is given shape by a square piece of galvanized-wire screening with two corners cut off diagonally. The rough edges are bound with adhesive plaster and the screen is molded to fit the face. One or more thicknesses of gauze is sewed, or attached by clips, to the mesh

COURTESY JOURNAL AMERICAN MEDICAL ASSOCIATION

and can be renewed as often as desired. Pieces of tape attached to the middle of the sides are tied back of the head to hold the mask in place.

KEROSENE FUEL GENERATOR HAS HIGH EFFICIENCY

Zero weather is claimed to have no effect upon the satisfactory operation of a new fuel generator that is being used as standard equipment on a well-known truck. It is intended to permit the use of kerosene, distillate, or benzol, but in addition is guaranteed to reduce by a third the consumption of gasoline, when it is burned. Fuel is superheated to 500 or 600° by passage through a coil interposed in the exhaust pipe. Air is taken in separately so that upon striking the hot, gasified fuel it cools it almost to the point of precipitation. The device is able to handle,

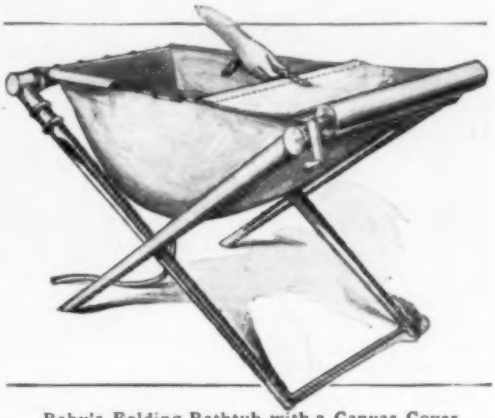


The Generator Distills and Gasifies Low-Grade Fuel, Which Burns So Completely, It is Claimed, That There Is No Unburned Oil to Leak Past the Piston Rings and Cause Trouble

without special adjustment, mixtures of kerosene and gasoline from half and half to straight kerosene. Furthermore the power developed increases with the increase of kerosene.

FOLDING NURSERY BATHTUB AND STAND COMBINED

A portable bathtub with a folding frame like a camp stool is a new article for the nursery. To the upper cross-pieces of the frame is attached the water container of rubberized fabric. On a roller mounted at one side is a piece of canvas that can be stretched tight across the top of the tub to form a dressing stand. The sides of the tub are held taut by folding braces that lock when opened. Two legs are detachable and can be laid across a sta-

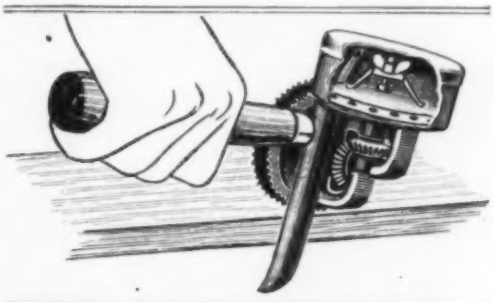


Baby's Folding Bathtub with a Canvas Cover That can be Drawn across the Top to Form a Dressing Stand

tionary tub to support the smaller tub, when so desired, making the outfit suitable for use in a bathroom.

HAND DRILL AND PLANTER SAVES TIME AND SEED

An invention that saves time as well as seed in garden or hothouse planting is a hand seeder operated by a ratchet wheel which is run along the edge of a board laid on the ground to be planted. The wheel causes a perforated disk in a seed chamber to revolve, discharging seeds at regular intervals into a drill. The latter is held



New Tool for Garden Makers with Which Seed of Many Sizes can be Planted Much Faster and More Evenly Than by Hand

at any desired depth so that all planting can be uniform. The device can be used for seeds of any size.

HOW BOY AND GIRL PATRIOTS HERE AND ABROAD

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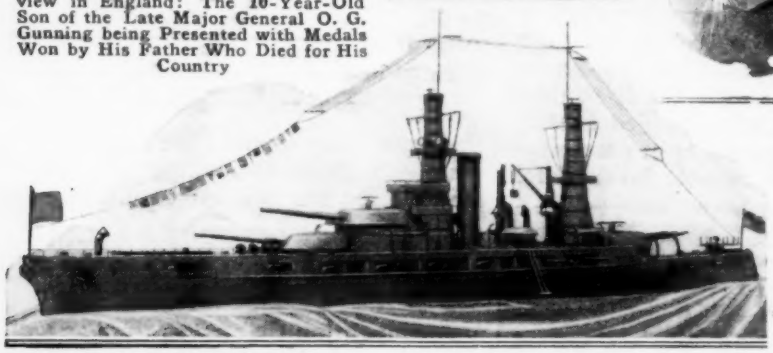
A Touching Scene at a Military Review in England: The 10-Year-Old Son of the Late Major General O. G. Gunning being Presented with Medals Won by His Father Who Died for His Country

Clever Toy Tank of Wood, Munitioned with Fireworks That Flash 20 Shots in Succession: Said to be Entirely Harmless



An 18-Foot Model of a Battleship, Built by Manual-Training Boys in the Polytechnic High School at Riverside, California: It is Fully Equipped. A Motor Causes It to Rock as if Pitching at Sea. The Builders Won a $250 Prize

In Lyons, Illinois, It Is No Longer "Against the Rule" for Lambs to Follow the Marys to School, because Almost Every Child is Raising One, Bought with War-Garden Money, to Increase the Wool Supply. Part of the School Work Includes the Judging and Care of Sheep and Lambs, as Shown Here

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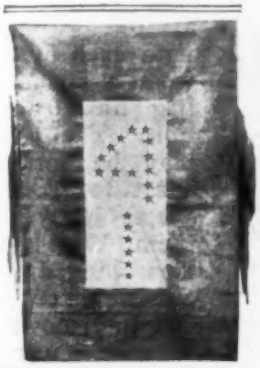
ARE SERVING THE CAUSE IN AND OUT OF SCHOOL

Student Cadets from the East Technical High School of Cleveland, Drilling with Guns Designed and Made by Them in Their Classrooms



Flag Awarded to 41 Seventh-Grade Girls in School Number 19, Brooklyn, for Selling 41 War-Savings Stamps, the Best Record Made in a Recent Contest in the School

Above Is One of the Drill Guns, Having All the Parts of a Real Firearm. The Larger View Shows the Cleveland Boys in Their School Workshops and Some of the Guns in Various Stages of Construction

This Is "Potato Day" in the Family of Colonel Mildmay, a Member of the British Parliament. The Enthusiastic Group Includes the Member's Wife, Children, and Servants, Each Ready to Do Far More Than a Bit in the Potato Patch

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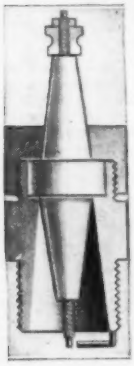
NEW DUPLEX SWITCH FITS SINGLE-SWITCH BOX

For controlling two independent lighting circuits from one point a new switch is being manufactured that can be substituted for two separate single-pole switches requiring a two-gang switch box. The new device consists of two push buttons mounted in a porcelain cup, each switch having its own line and circuit terminals so that separate feeds for two circuits can be brought into it. It fits a shallow single-switch box and takes a standard two-button plate.

DOUBLE-END SPARK PLUG HAS TWO LIVES

Something really new in spark plugs is a double-end device which has two lives. In case a crack develops either above or below the shoulder, it is only necessary to reverse the position of the member in order to have it function properly. On the other hand a similar reversal is all that is required when carbon causes trouble and the moment does not happen to be a convenient one for cleaning the plug. The illustration explains the details of construction.

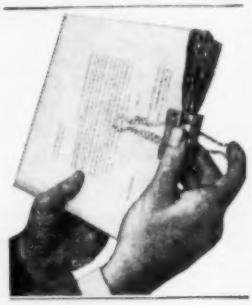


FORECAST THE WEATHER WITH SIMPLE CHART

A Frenchman has recently devised a simple method of forecasting the weather which he declares has proved quite reliable. A sheet of plotting paper is divided transversely into two equal parts, across the upper of which is drawn a line showing the barometric pressures from day to day at nine o'clock in the morning, while the temperatures at the same hours are shown by a line in the lower half of the sheet. The experience of the user of this scheme has been that whenever the two lines tend to converge, it is a sign of approaching rain or some other disturbance, whereas when the lines diverge, fair weather is reasonably certain.

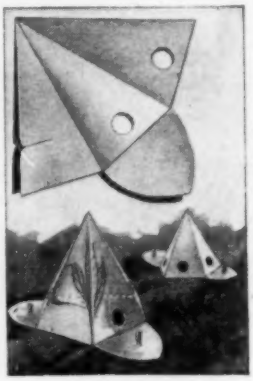
CLIP OF LARGE CAPACITY HAS HANDY FEATURES

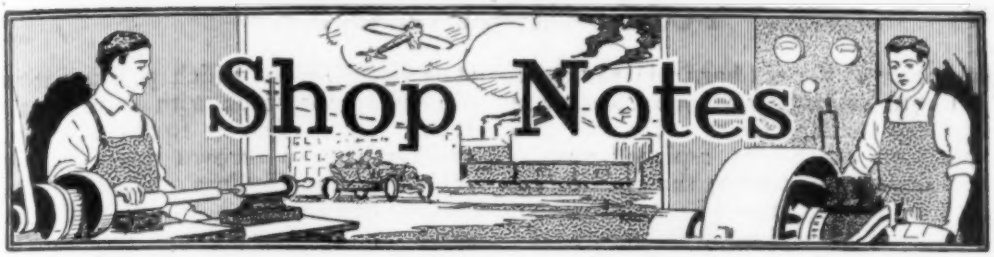
A clip for firmly holding together thick bundles of paper is now being made of sheet metal, with two broad jaws extending almost parallel with each other, from a connecting back portion. The jaws may be sprung apart to receive sheets between them. Wire handles hinged to either side of the device are a convenience in removing a bundle from a file, and an indexed card, inserted beneath tongues on the back, is a help in locating it in a file.



LOW-PRICED PLANT SHIELD OF CARDBOARD

Simplicity of construction and low cost are features of a new shield for garden plants. It is made from a single piece of cardboard so cut that it can be quickly folded to form a pyramid, having two flaps at the base on which dirt can be placed to hold it in position. Holes in the sides provide ventilation.





War-Time Efficiency Methods Applied to the Dairy Barn

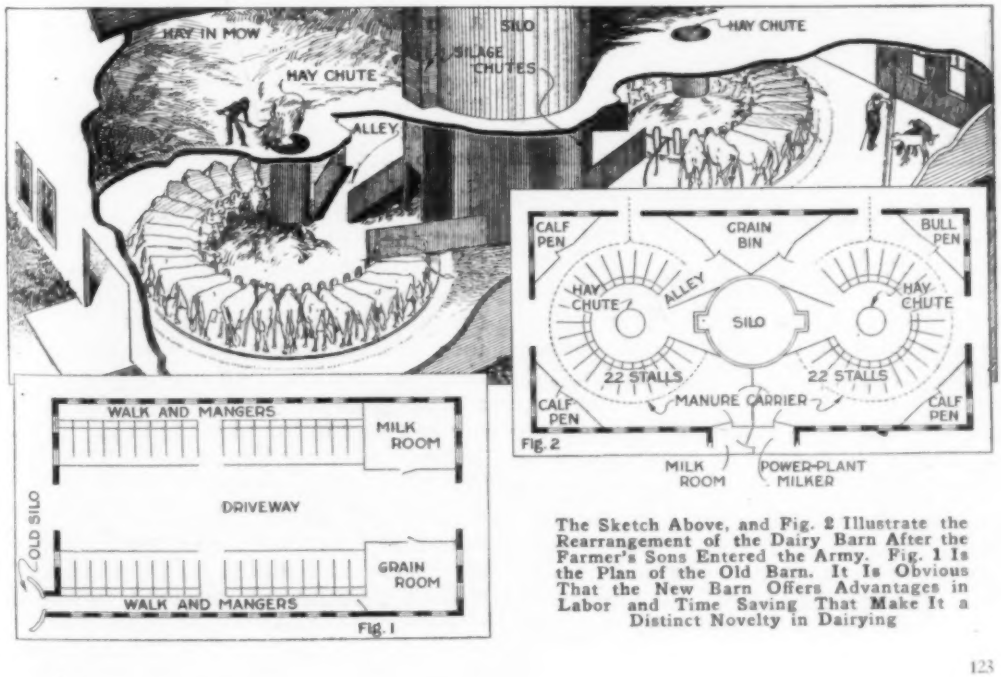
By H. V. STANLEY

A FARMER who conducted a dairy farm found himself seriously handicapped when his two sons enlisted in the army and he was left to attend alone a herd of 32 milch cows which formerly required the services of the three. At first it appeared as if he must dispose of at least part of the herd, as competent farm help was unobtainable. To have sold the stock would have meant the sacrificing of an estate that had taken years of toil to build up.

The problem was solved by rearranging the barn, as illustrated in the sketch, and laying it out on the plan shown in Fig. 2. With the remodeled barn the herd was not only retained but increased by eight head, while the farmer unassisted now accomplishes in less time the work which formerly demanded the entire attention of himself and his two sons.

Figure 1 illustrates the plan of the barn before the young men entered the army. In this form, the stable housed 32 milch cows. A bull and the calves were kept in separate pens and shelters adjoining. The cows were then milked by hand. Grain, hay, and ensilage were hauled about with pushcarts, while wheelbarrows were used for cleaning the place. The bull and calves also demanded separate attention. The amount of work entailed by this plan occupied the entire time of the three men.

In the remodeling, the entire interior



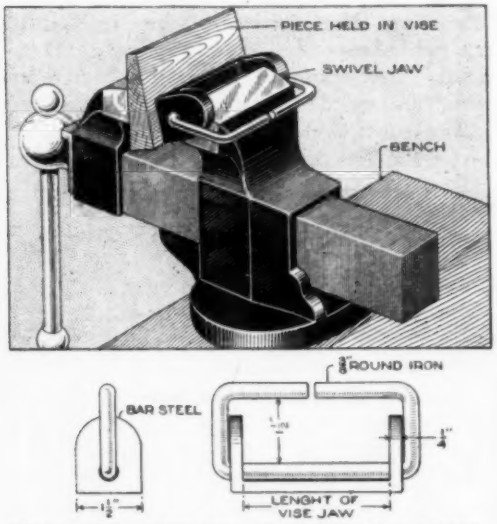
The Sketch Above, and Fig. 2 Illustrate the Rearrangement of the Dairy Barn After the Farmer's Sons Entered the Army. Fig. 1 Is the Plan of the Old Barn. It Is Obvious That the New Barn Offers Advantages in Labor and Time Saving That Make It a Distinct Novelty in Dairying

structure of the old barn was removed. The old insanitary wooden floor was replaced with cement. The old silo was torn down and replaced with a new one of concrete, in the position indicated in Fig. 2. The old rows of stalls and stanchions were rearranged as shown, with provision for 22 milch cows in each circle.

A power-plant milker, operated by one man, now does in 30 minutes the work that formerly took three men two hours. Feeding is also accomplished with a similar saving of time and labor by the new arrangement. Hay is thrown down from the mow, and from the chutes drops into the center of the stall circles, from which position it is pitched to the stock with little effort. When hay is thrown from the mow, ensilage is also thrown down and is accessible for feeding. The ensilage chutes extend through the roof and serve as ventilators for the stable. Mucking out is accomplished in less than an hour by the use of a wheeled carrier behind the rings of stalls, as indicated in Fig. 2. A small truck is used to carry grain from the bin and place it before the cows. The bull and calves, of course, are attended separately, but nevertheless at a great saving of time and energy over the old arrangement of the barn.

Swivel Jaw for Holding Wedge-Shaped Articles in Vise

Wedge-shaped or beveled-edge articles are usually difficult to clamp in a vise for the reason that one side of the vise jaws will not rest squarely upon the surface. Absolute security may be had in the clamping of such articles with the aid of a swivel-jaw attachment, as illustrated. The jaw is cut to the shape indicated from a piece of bar steel and is hooked over the permanent vise jaw with a ⅜-in. iron link, as shown. The dimensions of the swivel jaw are of course determined by the size of vise in connection with which it is to be used. It may be knurled on the clamping surface or left smooth as requirements demand.—C. C. Spreen, Flint, Mich.



With the Swivel-Jaw Attachment for a Vise a Wedge-Shaped Article may be Clamped as Securely in an Ordinary Vise as If the Surfaces Were Parallel

Auto Air Intake Guarded for Crossing Streams

Having frequent occasion to cross a small stream that was just deep enough to kill my automobile engine, I devised a scheme to obviate this nuisance. I disconnected the air intake at the carburetor, and placed one end of a piece of rubber hose, about 3 ft. long, over the nipple on the carburetor, fitting the joint air-tight, and bent the hose upward into the engine hood. The hose permits the air for the carburetor to be taken in above the water level, and the water therefore cannot drown it. The electrical timer is coated with grease and oil, and requires no protection for the minute or two consumed in fording.—P. R. Miller, Indianapolis, Ind.

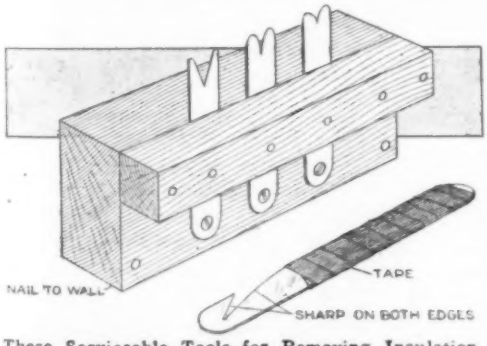
¶Old dry cells may be stimulated for temporary use by removing the wax at the top and moistening the interior with a solution of common salt and vinegar.

Cutting Small Copper Tubes with Side-Cutting Pliers

When small copper tubing is cut with pliers the result usually is that the end of the tube is pinched shut. By securing a few lengths of soft annealed-iron or copper wire of the same size as the inner diameter of the tubing, inserting them in the tube, and cutting both off together, satisfactory results may be accomplished. The wire serves to hold the tube intact so that it is cut without distortion of the end. After cutting, the stub of wire may be shaken out the other end of the tube or dislodged from it by inserting a piece of smaller wire.—Rutherford B. Williamson, Binghamton, N. Y.

Handy Electrician's Tools Made from Old Hacksaw Blades

A number of tools having a wide range of utility about the electrician's bench may be made by notching old hacksaw blades, as illustrated. If provided with different shapes and sizes of notches, several such blades, mounted on a block as indicated, will give one the means of almost instantly removing the insulation from a piece of magnet wire or heavy transmission feed wire. If taped, or otherwise provided with handles, such saw-blade knives become handy tools

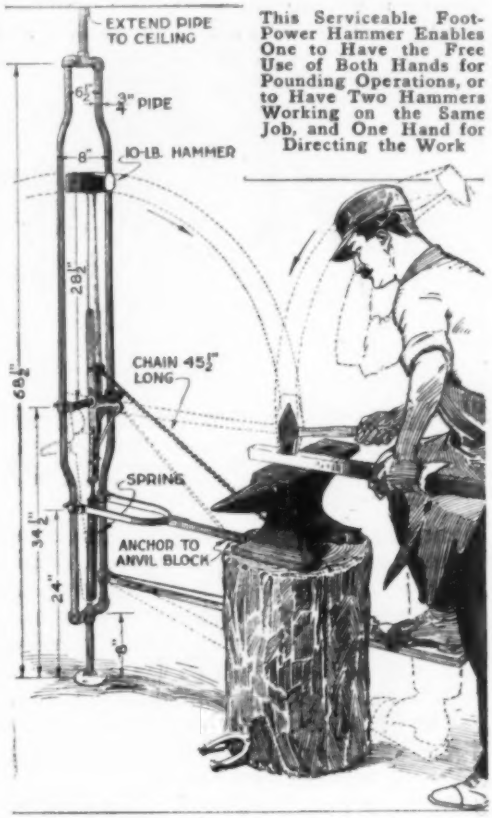


These Serviceable Tools for Removing Insulation are Made by Grinding Old Hacksaw Blades

for carrying in the pocket or for tool bag use.—C. A. Houseman, Cleburne, Texas.

A Foot-Power Hammer for Use in Small Shops

For welding and similar hammering operations a foot-power hammer, as



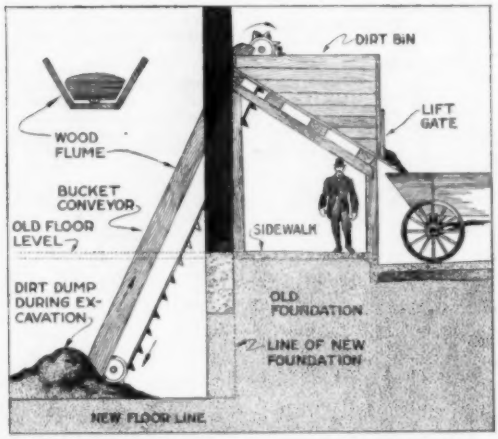
This Serviceable Foot-Power Hammer Enables One to Have the Free Use of Both Hands for Pounding Operations, or to Have Two Hammers Working on the Same Job, and One Hand for Directing the Work

illustrated, will speed up the work in small shops almost to the extent of the assistance of another workman. The construction of such a hammer is not difficult and may be effected by using materials ordinarily at hand. The frame is made from pipes and pipe fittings of the shape and dimensions indicated. The hammer is an ordinary 10-lb. sledge, mounted on a pivot casting as shown. A pattern for this was made and the casting done by a local foundry. All the other parts were made in the home shop.—J. N. Muncey, Jesup, Ia.

¶Holes in concrete are ordinarily caused by air bubbles. These may be eliminated by stirring after the concrete has been poured in the forms.

Labor-Saving Method of Excavating under a Building

By the use of a conveyor-belt and dump-bin system, as illustrated, a base-



Without Disturbing the Occupants of the Building or Obstructing Street Traffic, a Basement was Dug under an Apartment House by the Use of an Endless Conveyor Belt and an Overhead Bin

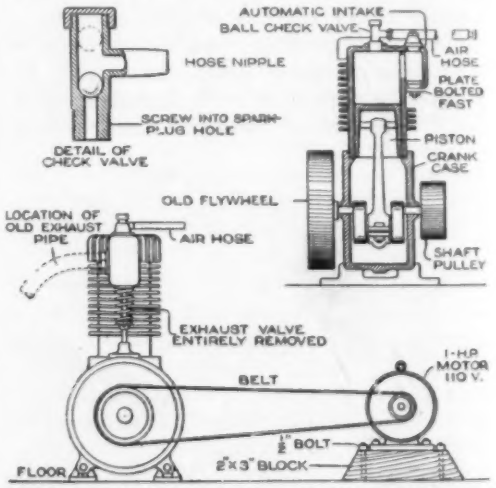
ment has been dug under a large reinforced-concrete building with a minimum of labor and without obstructing the sidewalk. An opening was made in the front wall of the building and a hole dug to the depth of the basement and large enough to install the conveyor. The conveyor was operated by a small motor and dumped the dirt taken from the excavation into a bin built high enough above the sidewalk to provide headroom underneath. A lift gate was built in the end of the bin and served to regulate the loading of the wagons.

Drawers under Bench Vise to Catch Filings

When working on costly metals a convenient method of preserving the filings is to have a tier of shallow drawers directly beneath the vise in which the work is being done. If it is lead upon which one is working, the top drawer is pulled out. The other drawers are used for copper, brass, aluminum, or bronze, as the case may be. Each drawer should be labeled and used exclusively for one kind of metal. It is then easy to collect and redeem the filings when a drawer becomes filled.

Garage Air Compressor Made from Discarded Cycle Motor

By making a few simple alterations on an old motorcycle engine that had outlived its usefulness as such, a garage man has provided his place with an excellent and economical air compressor. The motor was first rebored and a new piston fitted, to insure good compression. A steel plate, with a gasket under it, was bolted over the exhaust port, to close it. The original automatic inlet valve was left intact, to supply air to the cylinder when being used as a pump. A ball-valve hose connection was substituted for the priming cock on top of the cylinder, and the hose from it connected with the air tank. A longer main shaft was fitted to the engine, and on its end an ordinary shaft pulley was keyed and mounted, as illustrated. The old motorcycle flywheel, originally outside the crank case, was left in place to supply the necessary momentum. Steel lugs were made and bolted to the floor, and into these the motor base was fastened



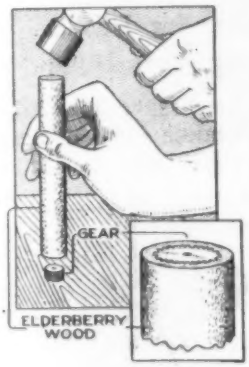
With a Nominal Outlay and Slight Mechanical Alteration a Discarded Motorcycle Engine may be Converted into a Serviceable Air Compressor for Garage Use

in the same manner as it would naturally be held in the frame of the cycle.

The completed compressor was belted to a 1-hp., 110-volt motor. Lubrication was provided by splash system, the oil being placed in the motor base. The completed outfit cost but a fraction of a new commercial article, but proved thoroughly satisfactory in its operation.—P. P. Avery, Garfield, N. J.

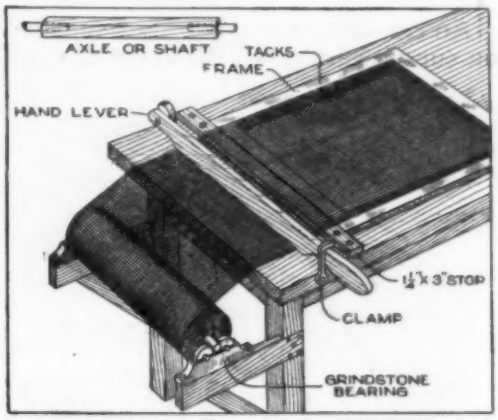
Efficient Method of Cleaning Small Pinion Gears

Small gears such as those of watches, clocks, and other light machinery, are quickly and thoroughly cleaned by being stamped into the pithy center of a piece of elderberry or burdock. All grease and residue are instantly wiped from between the teeth. The wheel is then shaken out, and the piece of wood prepared for the next one by being cut off beyond the used portion.



Device for Stretching Fly Screen over the Frames

By the use of the screen-stretching device illustrated, work is speeded up as well as accomplished with greater efficiency. Two wooden brackets are secured on the left-hand end of the workbench. These should be slightly lower than the top and provided with rollers, as indicated. An axle or shaft is then provided, and on this the screen is rolled. About 12 in. from the end of the bench, a stop is screwed to hold the screen frame while working upon it. A wooden hand lever is then pivoted to the farther side of the bench, and at the other end is provided with a metal clamp for locking it in position. The screen is unrolled from the stock, tacked to one end of the frame, and then stretched by pressing down the hand lever. The lever is clamped in position, and holds the screen taut

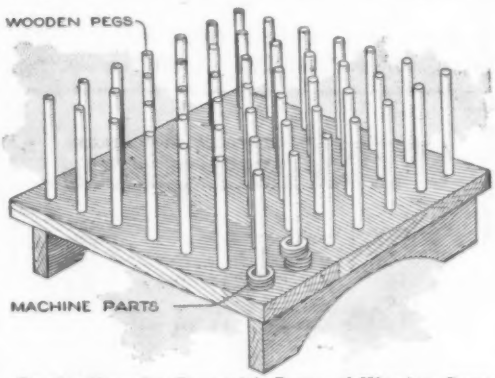


Tacking Screens to Their Frames is Simplified and Better Work is Accomplished with the Aid of This Bench Device for Stretching the Wire

while the tacks are being applied to the frame.—Herman F. Zimmerman, Los Angeles, Calif.

Tray for Moving Small Threaded Parts without Injury

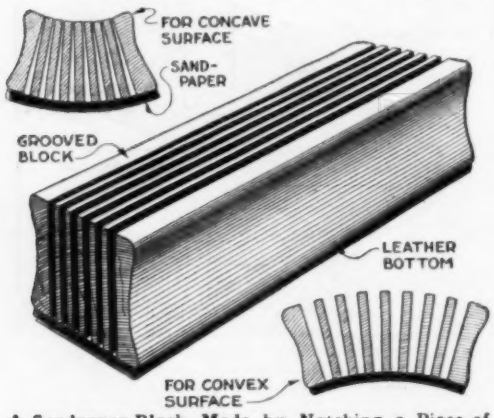
To truck small machine parts which are threaded both inside and out, without danger of damaging them, a carrying tray as illustrated is invaluable. The parts are slipped over soft wooden pegs which are so spaced over the surface of the tray as to prevent the parts from coming in contact with each other. Pegs should be of suitable length to hold 10 parts on each. This is a great aid in counting.



By the Use of a Tray with Rows of Wooden Pegs, Small Threaded Machine Parts are Handled without Danger of Injury and may be Counted at a Glance

Sandpaper Block for Use on Curved Surfaces

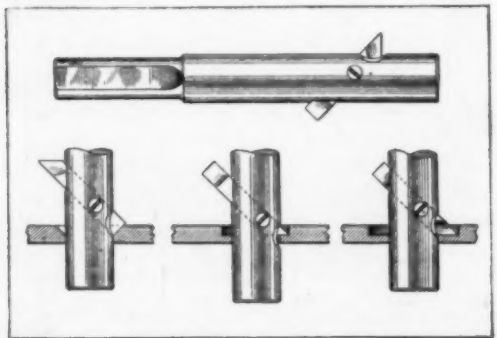
An excellent sandpaper block for use on curved surfaces is made by attaching a piece of heavy leather to a split block, as shown in the sketch. The block is first grooved and finished, as indicated. The leather is then glued to the lower surfaces. The sandpaper is cut to the proper size and glued to the leather. For sandpapering concave surfaces the upper side of the serrated block is squeezed together. For convex work it is spread apart.—Robert M. Thomas, Cheyenne, Wyo.



A Sandpaper Block, Made by Notching a Piece of Wood and Covering One Side with Leather, Which Permits Adjustment for Use on Curved Surfaces

Adjustable Counterboring Tool Has Many Applications

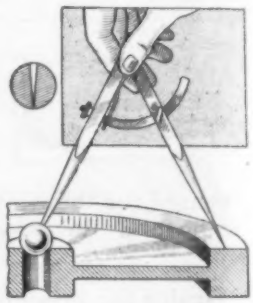
Mechanics whose work calls upon them for a variety of counterboring jobs will instantly recognize a wide range of applications for the adjustable tool illustrated. Any desired size or shape of counterbore may be made with the one tool, depending upon the setting that is given the cutting member, or the angle to which it may be ground. The cutters are of high-speed steel, and if the hole in the bar is to be made exactly 45° the cutting edge is measured with a protractor and ground accordingly. The bar is made of milled steel and should be casehardened.—M. L. Lowrey, Livermore, Calif.



The Sketches Illustrate Various Types of Counterbore Jobs to Which the Tool Is Applicable. As will be Noted, It Is Adjustable for Shapes as Well as Sizes of Counterbores

Sphere Attachment for Dividers When Measuring from Holes

It is sometimes necessary to mark castings a given distance from drilled holes. For such work a sphere attachment for the dividers, as illustrated, is useful. A smooth cast-iron or steel sphere having a tapered hole to take the divider point is secured, and is used as shown in the sketch. This attachment permits much greater accuracy than is obtainable by the use of a center-marked rivet or bolt.—W. H. Thomas, Davenport, Ia.



Formula for Making Strong Asbestos Plaster

Asbestos, or magnesium, plaster, as ordinarily applied to large tanks and hot-well pipe joints, is sometimes lacking in mechanical strength although satisfactory as a heat insulator. By mixing in the plaster 100 parts of asbestos fiber, 8 to 10 parts Portland cement, and 6 parts of common salt, a material is produced which has both strength and weather-resisting properties.—Maurice St. Johns, Montreal, Quebec, Canada.

A Scout Monoplane

Built in the Home Workshop

by George D. White

THIS article is the third of four on the subject of airplane building that Popular Mechanics Magazine will publish. The first installment, which appeared in the May issue, dealt with wing construction. The second chapter, published in June, gave details for covering the wings, building the body frame, and landing gear. This chapter and the concluding one will describe additional stages of development with the view of making it possible for men and boys, or groups of boys, of average mechanical ability to construct a successful airplane.—Editor.

Part III—Streamlining the Fuselage

SINCE the fuselage is inclosed it should be made as nearly streamline as possible. This is accomplished with thin strips, ¼ in. thick and ½ in. wide, slightly rounded on top. The cross section of these is shown in Fig. 9. These strips are attached along the sides, top, and bottom of the fuselage, by screwing them to the struts. The great air pressure on the sides of the fuselage would press in the cloth covering between the struts if these strips were not used. The location of the strips is also shown in Fig. 9. Fasten these with one screw in each strut, using ½-in. screws. On each side of the fuselage, three strips are attached in the locations shown, 6 in. apart. Two strips run to the rear of the fuselage, while the lower strip runs only to strut No. 7. The strips extend forward only to strut No. 3. Forward of this point the fuselage is covered with metal. On top of the fuselage, starting at strut No. 4, three strips are needed. The center strip runs to the rear, while the other two extend as far back as strut No. 6. On the bottom of

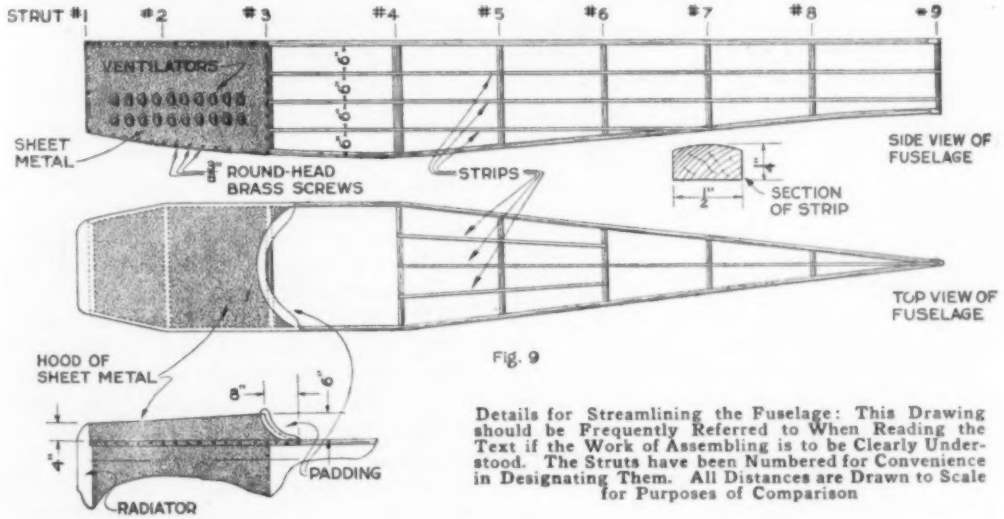


Fig. 9

Details for Streamlining the Fuselage: This Drawing should be Frequently Referred to When Reading the Text if the Work of Assembling is to be Clearly Understood. The Struts have been Numbered for Convenience in Designating Them. All Distances are Drawn to Scale for Purposes of Comparison

the fuselage three strips are needed and continue as far back as the upper

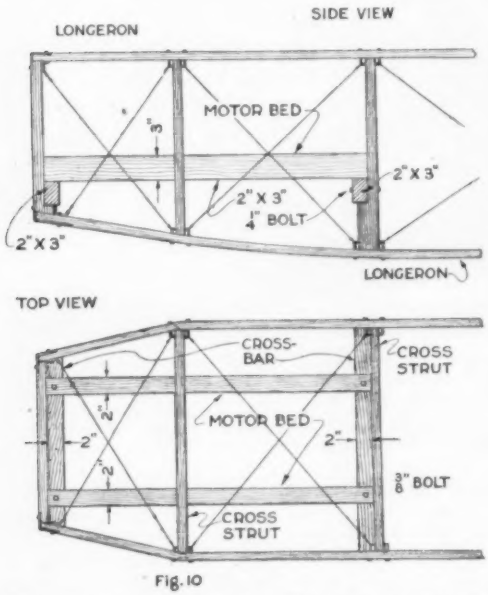


Fig. 10

The Details of the Engine Bed may be Readily Altered to Suit Special Types of Motors That may be Used. The Spacings of the Motor Bed Members Given Are Therefore Only Approximate

strips, but run forward to strut No. 3 the same as the side strips. In screwing on these strips, the round side should project outward with the flat side against the struts.

Attaching the Hood and Side Panels

On the sides and bottom of the fuselage, from the nose back to strut No. 3, sheet metal will be used for covering. Sheet aluminum is best. Some of the alloys are suitable, or ordinary galvanized iron may be used. First cut the metal in one sheet for each side and bottom the size needed. This size is the distance between the outside of each longeron in the fuselage. Drill holes around the edge of the sheet for 3/8-in. round-headed brass screws. Cut some ventilator holes in the side of the sheet, as shown in Fig. 9, to allow the air to escape. These ventilators are the same as are used on automobile hoods. The side panels are then merely screwed to the sides of the longerons in their proper places. The hood or top covering is also made of sheet metal and is 4 ft. long. At the cockpit it projects up 6 in. above the fuselage, and tapers 2 in. at the front so the front is raised 4 in. above the fuselage. The hood is easily bent into shape with the top curved, and can be formed while attaching. Screw the bottom edges to the top longerons of the fuselage with 3/8-in. screws. The edge of the hood in front of the pilot's face should be padded. Punch holes 1 in. apart, 1/2 in. from the edge, all around the edge. Cut a strip of leather, 4 in. wide and about 4 ft. long. Punch holes along each edge, 1 in. apart, and lace this through the edge of the hood. Lace it to the top all the way across and stuff it with hair while turning it down and lacing it underneath the cowl. This will produce a 1 1/2-in. soft roll all around the edge. After the hood and side panels are attached they should be enameled. Where the hood projects over the front of the fuselage a short distance, if a water-cooled motor is used, the radiator will fit, making a smooth joint, and if an air-cooled motor is used it may be left open.

Motor Beds

After the hood and side panels are fitted they are taken off and the motor bed put in. The bed timbers should be of hickory or ash, 2 in. wide and 3 in. deep. Struts Nos. 1 and 3 in the fuselage are the shape shown in Fig. 10. The sizes were given in Part I. Two crosspieces, 2 by 3 in., are bolted across the upright struts, as shown, with 1/4-in. bolts, one bolt in each end. The motor-bed members will bolt to these. The motor-bed members are bolted direct to the cross struts. Use 3/8-in. bolts for the fastenings. The exact distance between them cannot be given as it will depend upon the particular motor the builder will use, and it is possible to use any one of a number of suitable motors, as will be explained. Where the bed bolts to the crosspieces and where the motor will bolt to the bed, tin should be wrapped around them to prevent splitting.

Covering the Fuselage

Where the fuselage is not inclosed with metal, and with the exception of

the top of the cockpit, it will be covered with linen of the same weight and grade used on the wings.

This cloth should be cut in four pieces: two the size and shape of the sides of the fuselage; one piece the size and shape of the top of the fuselage, and one the size and shape of the bottom. Sew these pieces together edge to edge. This will make the seams come on the corners of the fuselage. Sew the cloth with three edges together, to form a piece about 9 ft. in width.

Start tacking it to one of the lower longerons, on the bottom. Tack it all along; stretch it up the side of the fuselage; tack it to the top of the upper longeron on that side; then stretch it across the top and down the other side, tacking it again to the lower longeron at which the tacking was started. Do not tack it along each strut, as it is necessary to tack it only at each end, and to the longerons. Cover each row of tacks with a strip of linen tape as was done when covering the wings. After covering the fuselage, the cloth should be doped and varnished the same as the wings. If desired, the fuselage need not be covered until the last thing, instead of after streamlining it and installing the motor bed.

The Cockpit

In the cockpit of the machine is installed the seat and control wheel. A bucket seat, about 18 in. wide, is best. If the back is made of heavy metal, large holes may be drilled in it to lighten it somewhat. To attach the seat, bolt two beams across struts Nos. 3 and 4, as in Fig. 11. These beams should be ¾ in. thick and 1½ in. deep. Across these, bolt two more beams, 1 in. square, and bolt the seat to these. The seat should be located 20 in. from the top of the longerons and be given a slight tilt. Ahead of the seat will be located the foot bar and steering wheel when the controls are connected up.

Attaching the Wings

The wings can next be attached to the fuselage so that the controls may be connected up, and then the machine will be practically complete. The front beams of the wings will attach to struts No. 2 of the fuselage, and the rear main beams of the wings will attach to struts No. 4. Wing-beam fittings are made from sheet steel, as shown in Fig. 12. These fittings will be bolted against struts Nos. 2 and 4, as illustrated. They should be located so as to hold the front beam 4 in. from the top of the fuselage and the trailing, or rear, edge of the wings 13 in. from the top of the fuselage. This gives the wings the correct angle in the air. This is called the angle of incidence. From ¾-in. steel tubing make two pylons, as in Fig. 12. The tube must be heated to be bent into shape, the ends are then

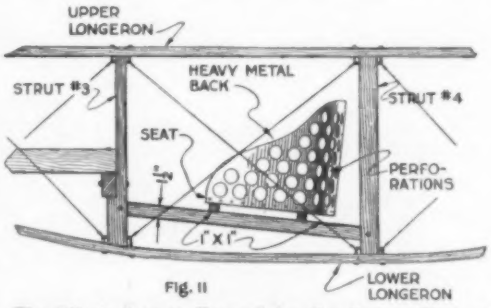
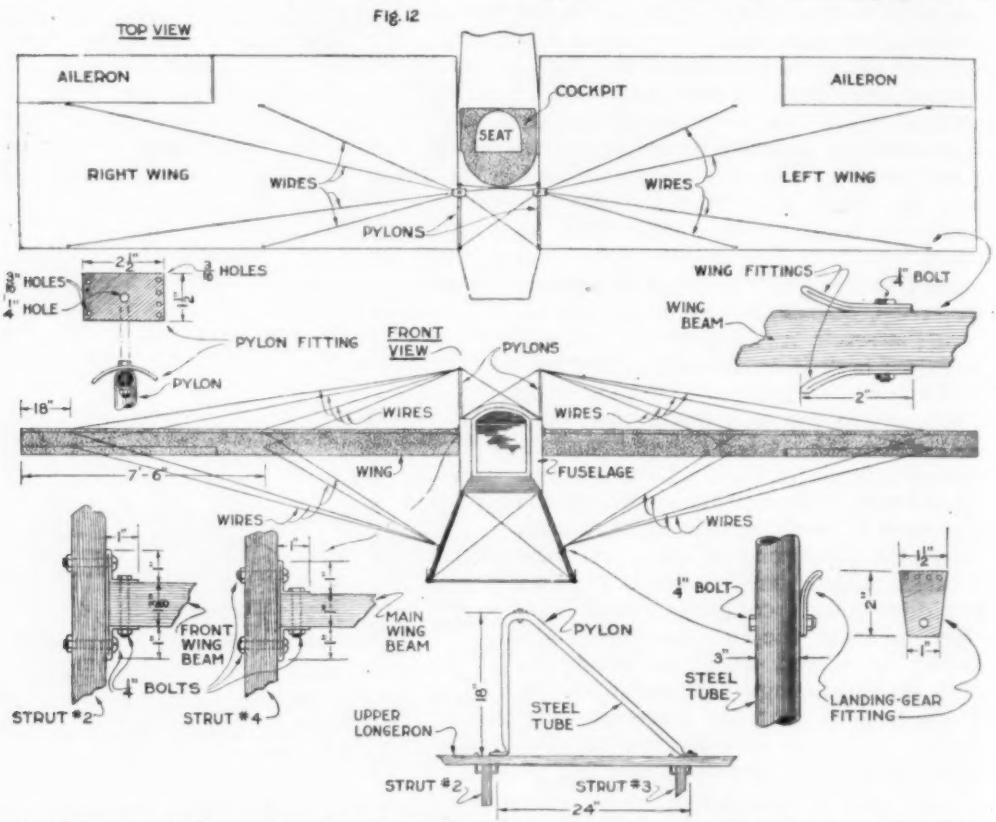


Fig. 11

The Pilot's Seat is Formed by Bending a Piece of Heavy Sheet Metal, Preferably Aluminum. It is Perforated Full of Large Holes to Reduce Weight. The Location of the Seat in Relation to the Machine is Indicated by the Strut Numbers

flattened out, and a ¼-in. hole drilled in each end. The pylons will bolt to the top of the upper longerons of the fuselage, using one arm of the U-bolts that hold struts Nos. 2 and 3 in place. Cut a rectangular piece of steel as also illustrated in Fig. 12. Drill a ¼-in. hole in the center, four 3/16-in. holes in one end, and two 3/16-in. holes in the other end. This fitting is bent to a curve, as shown in the edge view in Fig. 12, and is bolted to the top of the pylon with a ¼-in. bolt, through the hole drilled in the center. Bolt such a fitting to the top of each pylon, with the side of the fitting with four holes in it toward the tips of the wings. In the four holes, four wires will be attached, running to four points on the top of each wing. From the two holes in each fitting, wires will run to the bottom of the pylon on the opposite

side, as in Fig. 12. Four wires will also be taken to the bottom of the wings or eight wires to each wing, 20 in all. Make 16 wing fittings, as in



A Good Idea of the General Assembly of the Machine is Conveyed by the Above Sketches. The Wiring Arrangement, the Wing Fittings, and Wire Fastenings are Shown in Detail. When the Machine has Reached This Stage of Construction All the Most Difficult Work will have been Accomplished

Fig. 12. These are 2 in. long and 1 in. wide, made from sheet steel, curved as indicated, and drilled for fastening to the wings with ¼-in. bolts. Holes, 3/16 in. in diameter, are drilled in the other ends for attaching the wires. Bolt one of these above and one below the front beam, 18 in. from the outer tip; one above and one below the main beam, 18 in. from the outer tip; one above and one below the front beam, 7½ ft. from the tip, and one above and one below the rear beam, 7½ ft. from the wing tip, as in the general views in Fig. 12. Connect four wires from the fittings on top of the wings. For all wing bracing use No. 19 aviation cable, 5/32 in. in diameter. Four wires are also fastened to the bottom of each wing. A turnbuckle is fitted on each of these wires. Make two fittings to attach to the landing gear, as in Fig. 12. Make these of sheet metal, 2 in. long, 1½ in. wide at one end, and 1 in. wide at the other. In the narrow end drill a ¼-in. hole, in the opposite end drill four 3/16-in. holes, as shown. Through the ¼-in. hole bolt this fitting to the landing-gear "U," about 10 in. from the bottom. A wire connects from each of the four holes in the opposite end to the four fittings bolted to the wings. Study Fig. 12, and this will be clear. Remember that every wire should have a turnbuckle so it can be tightened when necessary.

Attaching the Stabilizer

The stabilizer is much more easily attached than the wings, as it is fastened directly to the top of the fuselage lon-

gerons, as in Fig. 13, and bolted with the aid of fittings. Make four angle-iron fittings, as shown in the upper detail of Fig. 13. Drill a 3/16-in. hole in each end, as shown. These fittings will be bolted to the upper longerons and the stabilizer beam will be bolted to the fittings. The fittings will be located so the rear beam of the stabilizer is even with the rear of the fuselage, thus the front fitting should be 2 ft. from the rear, as this is the width of the stabilizer. The stabilizer is also braced from below with ½-in. steel tubing, which extends from the bottom of the fuselage to the stabilizer beams, as in the drawing. Two pieces are used on each side. Flatten out each end of the tubes and bend as shown. The lower end of each tube will be bolted to the bottom of the lower longeron, using one leg of the U-bolt that holds the fuselage strut No. 8 in place. This is a 3/16-in. bolt. The upper end of the tubular brace is bolted with a 3/16-in. bolt to the front beam of the stabilizer, 12 in. from its outer tip. Another tube is bolted to the lower longeron, using the other leg of the same U-bolt, and the upper end of this tube is bolted to the rear stabilizer beam, 12 in. from the tip. All this is shown in Fig. 13. By this arrangement no wires are needed to hold the stabilizer rigid. Thus greater strength and less head resistance is obtained.

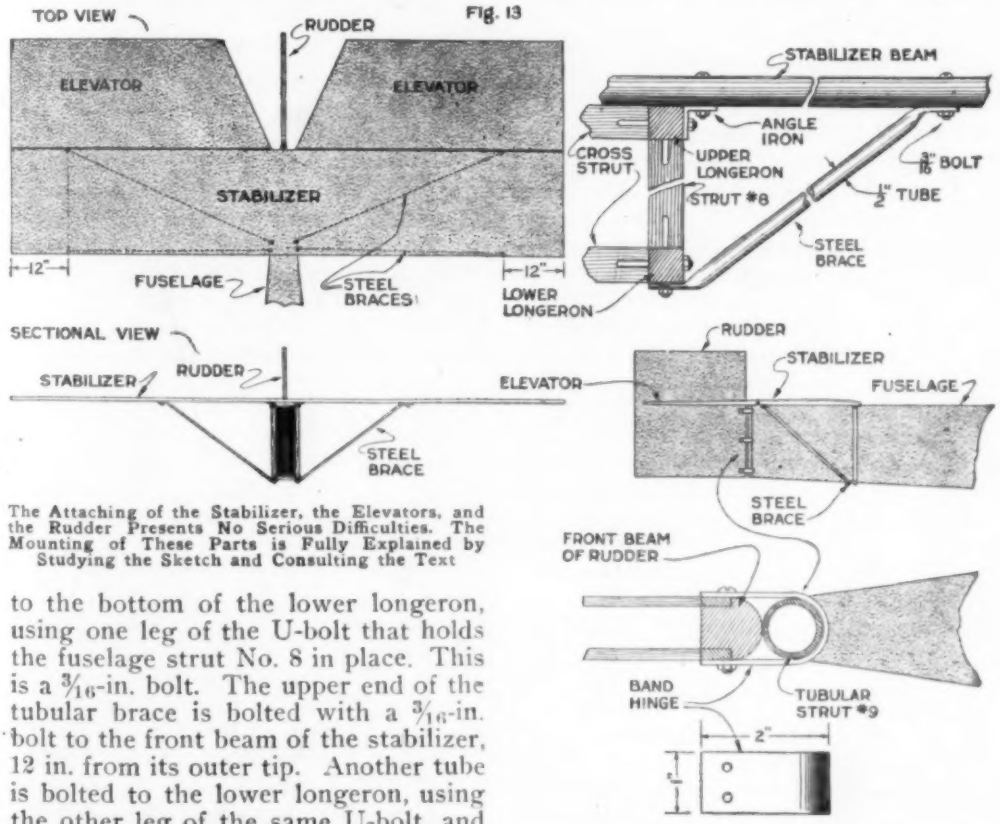


Fig. 13

The Attaching of the Stabilizer, the Elevators, and the Rudder Presents No Serious Difficulties. The Mounting of These Parts is Fully Explained by Studying the Sketch and Consulting the Text

Attaching the Rudder

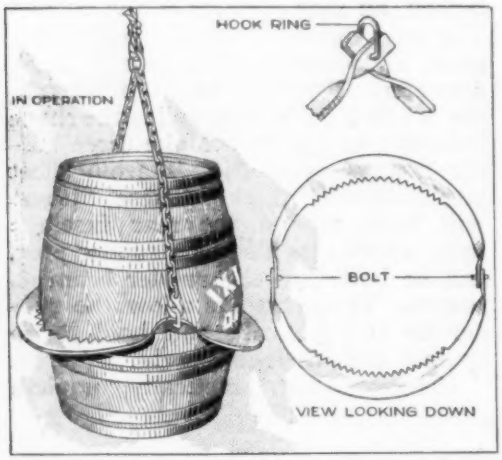
After the wings and stabilizer are attached, all that remains is the rudder. The rear of the fuselage comes to a point and consists of a tube 1 in. in diameter. The front beam of the rudder is also 1 in. in size, and is the shape indicated in Fig. 13. Make three rudder fittings as in Fig. 13 from sheet steel, .050 in. thick. These fittings will hook around the rear fuselage tube, which acts also as a rudder post, and be bolted to the rudder beam as shown. These fittings allow the rudder to swing easily and hold it up against the fuselage snugly.

The flier is now practically complete with the exception of connecting up the controls and installing the motor, fuel tanks, and controls.

(To be Concluded.)

Clamp for Lifting Barrels with a Crane

The clamp illustrated is a great saver of time and labor over the usual



Barrels are Handled by a Crane with Minimum Labor and Loss of Time with the Aid of a Steel Clamp That may be Instantly Applied or Released

method of handling barrels by picking them up with nets or end hooks. Its operation is similar to that of a pair of ice tongs, and once dropped over the body of the barrel, cannot possibly slip. With it the largest hogshead may be instantly picked up or released. In making such a clamp the dimensions are governed by the size of the casks to be handled. Cold-rolled steel, 5/8 in. thick, will be found about the right material for making the jaws of a clamp to lift the ordinary 50-gal. barrel. Around docks and warehouses, or wherever numbers of barrels are being handled, a few of these simple, inexpensive clamps will be found invaluable.—John Baptiste, New York, N. Y.

Prolonging the Life of Radiator-Hose Connections

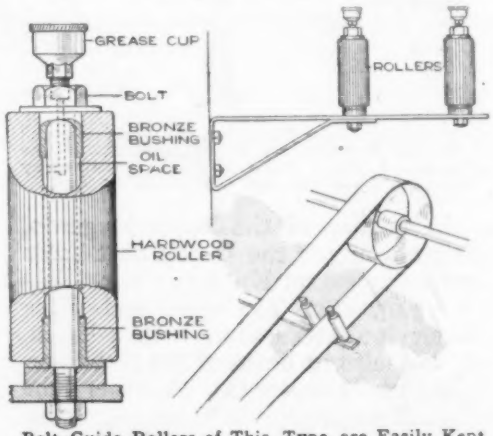
If all radiator-hose connections used about tractors, automobiles, and other forms of water-cooled internal combustion machinery, are taped and several coats of orange shellac applied over the tape, the life of the rubber will be materially lengthened. The combination of tape and shellac produces a covering which protects the rubber from oil, heat, exhaust vapors, light, and air. All of these are enemies of rubber which tend to corrode and rot it.

Tempering Steel without Injury to the Finish

Milled and other varieties of steel may be tempered without injury to the finish by placing the part in powdered boracic acid until it becomes completely coated with same. It should be heated only where the heat will affect it in tempering. After the part is coated with the boracic acid it is reheated for tempering. The coating thus formed will prevent the finish being burned or ruined.

Belt-Guide Rollers with Oil-Cup Fixtures

Frequently belts that extend across a long span have a tendency to run off the pulley, and a roller guide at the edges of the belt can be used to overcome this trouble. The rollers are usually made of hard wood, and having no proper metal bearing become heated and squeak, unless oiled often. A design for rollers of this type is shown in the sketch. Bronze bushings with flanges are mounted in the ends of the



Belt-Guide Rollers of This Type are Easily Kept Properly Oiled and Give Excellent Service

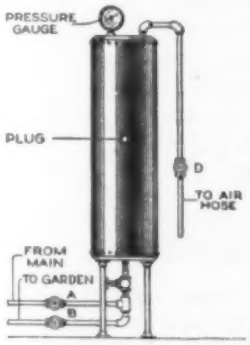
rollers and oil cups at the upper ends keep the rollers well oiled.—S. C. Flint, Cleveland, Ohio.

Oil Conserved by Using Soapy Water

In several railroad repair shops soapy water is being used successfully as a substitute for oil in mandreling and working boiler flues. It is not only much cheaper than oil, but reduces the danger of having the expander pin fly out, as frequently occurs when oil is used as a lubricant.

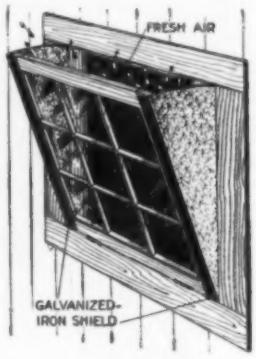
Inflating Tires with Air by Use of City Water Pressure

In communities where the city water pressure is 70 lb. or more, a tank may be connected up with little difficulty to supply air under the same pressure as the water. This is best accomplished with an old hot-water boiler, as illustrated. The pipes A and B are provided with separate shut-off valves and lead into the bottom of the tank through a connecting pipe which is also provided with a valve. A pressure gauge is fitted at the top of the tank, and the air pipe is fitted with a valve, D, as in the sketch. To inflate a tire the hose from the air pipe is connected with the tire valve. The valve in the outlet pipe B is closed while the valve in the connecting pipe under the base of the tank is opened. The valve A is then opened, and as the water rises in the tank, the air is compressed and forced through the pipe D into the tire. After the tire has been filled to the requisite pressure the water is turned off, the valve B is opened and the water drained out to irrigate the garden. The plug in the middle of the tank is fitted with a tiny glass-covered port so that it may be determined when the water level passes that point.—R. J. Midgley, Menlo Park, Calif.



Draft-Proof Window for Small-Shop Ventilation

In addition to the feature of providing ventilation without the usual drafts of ordinary windows, the structure illustrated has the advantage of excluding rain when open. The galvanized-iron shields exclude side drafts, and all ventilation is effected from the ceiling downward. Any ordinary window may be rebuilt into a window of this type. It is only necessary to hinge it at the bottom, provide the side shields and the grooves in the sash into which these fit. Windows of this type will help prevent colds that follow vigorous work near an ordinary window.—H. A. Shearer, Chicago, Ill.



A Simple Pipe Bender for Home or Shop Use

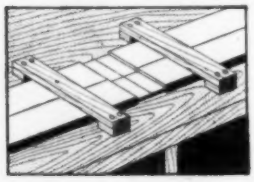
A pipe bender of such simplicity that anyone can make it is formed by combining a tee connection with a length of pipe, as shown in the sketch. The tee and the pipe used for the handle should be of a diameter slightly greater than that of the stock upon which it is to be used. By slipping the tee over the pipe and operating as illustrated, satisfactory work is accomplished on most ordinary jobs of pipe bending.

Pivot Stand Aids in Handling of Rough Lumber

Wherever quantities of rough lumber must be loaded, unloaded, or piled, a pivot stand, as shown in the sketch, is of great assistance in the work of handling. Such a stand consists of a central upright erected on two crossed bottom pieces, the ends of which are mortised into four slanting legs which grip the upper part of the central piece. Into the end of the upright is set a stout steel pin having a rather blunt point. The stand is placed alongside the wagon or lumber pile and is used as a pivot where leverage accomplishes much of the work ordinarily done by actually lifting each board.—Henry Simon, Laguna Beach, California.

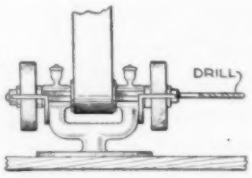
Rapid and Accurate Method of Making Tenons

The following manner of making tenons gives better results than the usual method, and takes less time than the ordinary way. After making the saw cuts determining the length of the tenons on the pieces, roughly shape the tenons to within 1/16 in. of the desired thickness. Then place the pieces in pairs opposite each other, as shown. Clamp them down, placing a piece of sandpaper, folded double so as to present two sanded sides, between the clamping strips and the pieces to be worked. This prevents slipping. With a router plane, level off the depressions; reverse the work, and level off the opposite sides. A set of tenons of unvarying accuracy will result.



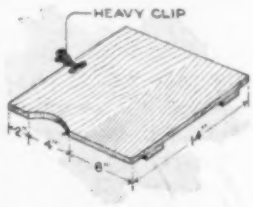
Boring Small Machine Parts after Grinding

Where a large number of small machine parts must be ground and drilled, much time and labor is avoided if the emery wheel is provided with the proper size of drill, as illustrated. This is best accomplished by boring the drill socket in the center of the wheel shaft, and locking the drill in position with a countersunk setscrew. Thus equipped, the operator is able to complete the two operations without changing his position.



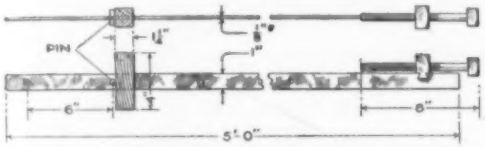
Handy Writing Board for Shop Material-Checking Work

For inventory or the checking in of shop materials, a writing board made of light wood, and of the dimensions illustrated, is a great convenience. The cut-out portion near the corner should be about 4 in. in width and 1 in. deep. The board should be sandpapered smooth and given two coats of spar varnish. In use, the board rests on the left forearm, the curved portion fitting into the angle formed by the elbow. It is easy to hold the board in this position, which will be found convenient for writing. A spring clip mounted near the upper edge keeps one's papers from blowing away or being misplaced when the board is tilted or set down. Stockroom clerks and shop foremen will find such a board useful in their work.



A Handy Clamp Made from Waste Materials

There are numerous clamping operations about the average small shop where a clamp of the type illustrated is useful, but if purchased ready-made, such clamps are almost prohibitive in price. A very serviceable article is made from an iron bar and an 8-in. machine bolt, as shown in the sketch. A threaded block is provided for the bolt and attached by means of a keystone notch to one end of the bar. The other end of the bar is provided with a hardwood block, as shown. This block is made adjustable by being fastened with a steel pin, which may be set in various holes along the body of the bar. The finished clamp is very powerful as well as almost instantly adjustable for any variety of work.—Norman Harris, Toronto, Ont., Canada.



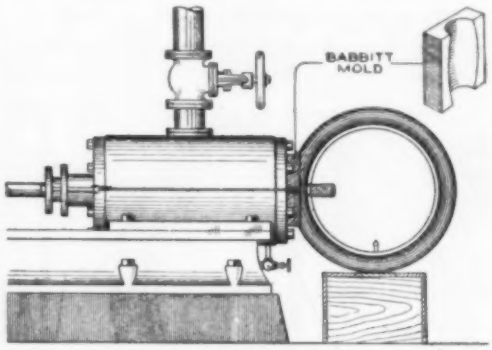
A Powerful Clamp, Having a Wide Range of Application, Which may be Made from Waste Materials Usually to be Found about the Small Shop

Method of Preventing Binder Canvas from Ripping

To prevent grain-binder canvas from ripping, rivet a leather strap along the underside outer edge. A rivet should be placed near the end of each slat to allow for stretching in the canvas. Ordinarily the canvas wears through first at the end of the slats. The leather strap will prevent this.—Stanley Dougan, Pawnee, Okla.

Device for Vulcanizing Tires on Steam-Engine Cylinder

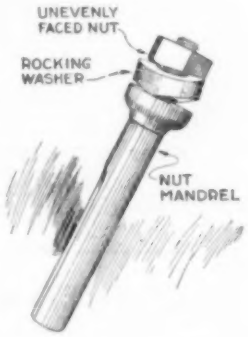
Wishing to retread a motorcycle tire and not having a vulcanizer, I improvised an outfit which did the work satisfactorily. A mold to fit the tire was cast from babbitt metal and propped against the engine cylinder until thoroughly hot. The tire was then placed in position and clamped by means of a stick put through it and wired to a bolt on each side of the cylinder, as illustrated. With 80 lb. of steam it took about an hour to thoroughly vulcanize a section of a 3-in. casing. A larger tire would of course take more time.—M. C. Metzer, Silver Creek, Neb.



By Utilizing the Heat of a Steam-Engine Cylinder Satisfactory Vulcanizing may be Accomplished with the Aid of an Improvised Babbitt Mold

Mandrel for Truing the Faces of Nuts

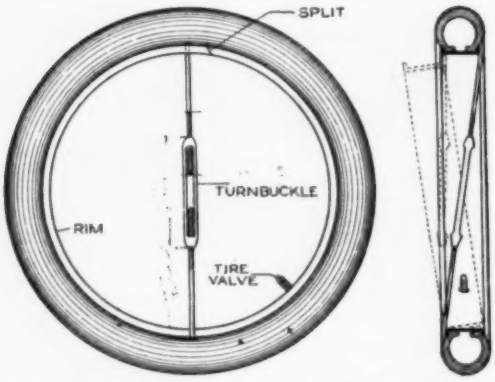
The most unevenly faced nut may be quickly trued with the aid of the rocking-washer mandrel illustrated. Regardless of how uneven the face of the nut may be, it may be turned down securely on the threads of the mandrel. The mandrel is then placed in the lathe and the surface of the nut is marked and faced off. The mandrel is made from tool steel, or milled steel thoroughly casehardened.



¶In tinkering on automobile engines, searching in the mud pan for dropped tools and parts may be avoided by stuffing sacking into the space between the engine and chassis frame.

Serviceable Tire Remover for Cars Equipped with Split Rims

By fitting rods with hooked ends into a double-threaded turnbuckle as illustrated, an excellent tool is provided for



By Tightening the Turnbuckle the Rim is Contracted Until the Tire is Disengaged

removing tires from split rims. In use, the hooks are engaged on the opposite flanges, one of them being placed near the division point of the rim. By then tightening the buckle to give the necessary contraction, the tire may be easily removed.—Fred Reschke, Racine, Wis.

Heavily Laden Fruit Trees Braced with Wires

Heavily laden fruit trees, having a central main stem or trunk, may be effectively supported by using lengths of wire for supporting the lower limbs from a point above on the central member. Both the trunk and the limb should be well padded before the wire is applied, and care should be used to see that the wire does not bind the bark on more than one side. After the padding is placed, the wire is extended between the two points in double strands. A stick is then thrust between the wires, which are twisted to draw them taut. When one limb has been thus supported it is best to wire the next limb on the opposite side of the trunk, and so on, until the tree is wired on all sides.—C. J. Lawless, Lincoln, Neb.

Novel Method of Getting Tractor Out of a Mud Hole

While being driven across country a large bull-wheel tractor became mired so badly that it could not pull out on its own power. A team of heavy horses were hitched to the machine, but were unable to move it. The method illustrated was tried, and the tractor came out of the hole with very little effort. Brush was placed in front of the bull wheels to form a hold for the strakes. The clutch was let in and then 100 ft. of stout rope, which had previously been wound about the power wheel, was unwound by hitching the horses to the end. The pulling power of the horses was thus exerted through the driving gears, creating a force far greater than the resistance of the mud and the weight of the machine. The rope had to be unwound from the power wheel several times before the

By Applying the Pulling Power of a Team of Horses to the Unwinding of a Rope from the Power Wheel, the Force was Transmitted through the Gears to the Bull Wheel of the Tractor

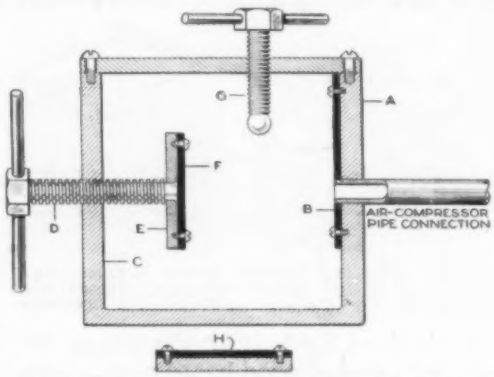
tractor was clear of the hole, but the work was quickly done and with little difficulty. For this odd application of power, the cylinder cocks of the engine were opened to relieve compression.—Carl William Thies, Cedar Falls, Ia.

Reamer for Accurate Work in Wood

It frequently happens that holes in wood must be bored to give a very accurate fit, such as a light wedging fit, or a snug sliding fit for a pin. For such work a beveled-end reamer, as illustrated, is of great service. The reamer is made by beveling off the end of a piece of cold-rolled steel of the required size and slotting it with a hacksaw and file, as indicated. The faces of the cut should be smoothed with a fine file, using care to keep the cutting edges intact. The knife-edges of the reamer will cut out all projecting material and the notch will collect the shavings.

Efficient Method of Testing Motor Journal Bearings

In plants provided with an air compressor a practical method of testing journal bearings for possible leakage is shown in the illustration. This consists of a cast-iron frame, large enough to accommodate the bearing. The side A, in addition to being equipped with air-compressor connections, contains a rubber pad, B, through the center of which a hole has been drilled to permit the passage of air. The other side, C, contains an adjusting screw and handle D. The end of the screw is fitted with a loose cast-iron cylindrical plate, E, to which is also bolted the rubber pad F. The ball-pointed screw G, passing through the top, is used in conjunction with the block and pad H. The journal box to be tested is placed in this rigging and held in position by the screw D. The block H is placed

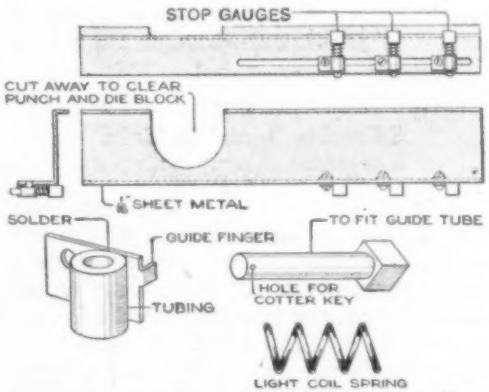


Motor Bearings are Held in This Frame While Flaws are being Located by the Use of Compressed Air

over the cover opening and clamped down by the ball-pointed screw G. This renders the bearing entirely air-tight, and by turning on the inlet valve forming part of the air compressor it is a simple matter to detect any flaw, which is then remedied by plugging the holes with lead. This method of testing reduces to a minimum any motor-bearing trouble arising after the finished product has left the factory.—Frank H. Rapp, Atlanta, Ga.

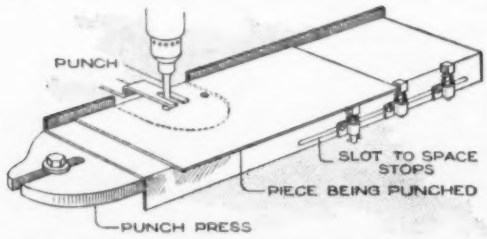
Spacing Gauge for Power-Punching or Drilling Sheet Metal

When a number of pieces of material are being punched, or drilled, simultaneously, a spacing gauge, as indi-



Component Parts of the Punching and Drilling Gauge Showing the Details of Construction Essential for Constructing It

cated in the sketches, will be found of material assistance in attaining the degree of accuracy desired. Best results



The Punching and Drilling Gauge in Operation: With Its Aid All Guesswork is Eliminated and Spacing Becomes a Matter of Mechanical Accuracy

are obtained by bolting the gauge securely to a hardwood board and in turn bolting the board to the drill-press, or punch-press, table. While three stop gauges are shown in the illustrations, these may be arranged to suit individual requirements.

Tank for Cleaning Screw-Machine Products

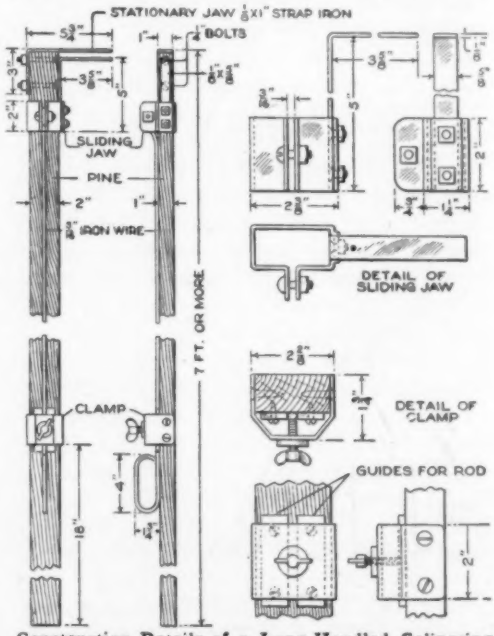
Small manufacturers not desirous of installing an elaborate system for removing the oil from screw-machine parts after completion, will find the following simple method useful: Construct a sheet-iron tank, about 24 in. deep and 24 in. square, and erect it in such a position that a steam pipe line passes through it. Fill the tank with a solution of 5 to 6 lb. common washing soda and water. It is necessary to skim the surface occasionally to remove the oily matter caused by frequent immersions in order to insure clean soda water at all times.—Joseph Plogman, Cincinnati, Ohio.

Selecting Wood to Take an Ebony Finish

Any close-grained wood may be ebonized, but the most satisfactory wood is cherry. For small articles, birch, persimmon, apple, or pear wood may be used, the latter being the favorite wood for piano keys. Woods having prominent medullary rays, like quarter-sawed sycamore, maple, or beech, are not so good as wood with an even-grained surface, similar to the grain of ebony. Whitewood or poplar, basswood, and similar woods, are used for cheap work, but woods like ash, oak, and elm are not suitable for ebonizing, as the cellular grain prevents the resemblance of ebony. The same is true of pine and cypress, or any other woods with broad grains of different texture.—Charles A. King, Plymouth, New York.

Calipers for Overhead Work Eliminate Use of Ladder

Ladders are usually treacherous, and this is especially true when they are used on the frequently greasy floor of machine shops or around machinery in operation. For calipering shafting, pipes, and other shop equipment that is out of reach from the floor, the stick illustrated is both a saver of time and a promoter of safety. The stick should be made from oak, or other clear, hard wood. The metal fittings may be of any grade of steel that is soft enough to be readily worked. In use, the upper jaw is passed over the object to be

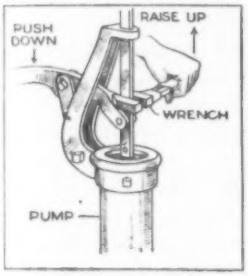


Construction Details of a Long-Handled Calipering Device, by the Aid of Which Shafting, Pipes, and Similar Overhead Mechanisms may be Measured without the Use of a Ladder

measured. The lower jaw is moved until it is in firm contact with the lower surface, and is locked in that position by tightening the wing nut controlling the clamp mechanism on the handle. The size of the object calipered is then determined by measuring the distance between the caliper jaws with a ruler.

Efficient Method of Recovering Pump-Jack Rods

When connecting a pump-jack rod with a windmill, great difficulty is often experienced because of the rod dropping down so the connecting pin cannot be passed through. Such fallen rods may be easily pulled back by gripping them with a monkey wrench as shown in the sketch. After being applied, the handle of the wrench is pulled upward until the jaws take a firm hold on the rod. The handle of the pump is then used as a lever to pull the jack rod into place.—Will F. Benzel, Rockford, Ia.



Extension Control for Tractor Aids in Work of Plowing

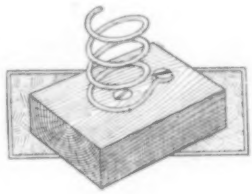
When pulling a riding plow with a tractor, more efficient work is accomplished if one is on the plow. To accomplish this I have fitted my tractor with an auxiliary control, as illustrated. An old automobile steering wheel was purchased in a junk yard, and a little blacksmithing in the farm workshop completed the control system. Two ½-in. rods, connected, just above the drawbar, with a universal joint and fastened to the tractor steering wheel and to the second wheel, furnished the extension guide. The rod was fastened to the tractor by making a "U" on the end and running the ends through the spokes of the steering wheel and on through an iron bar which was bolted in place. Supporting rods were also attached to the tractor and to the plow.

The Auxiliary Tractor Control Enables the Operator to be on the Riding Plow and to Handle Both Machines with Maximum Efficiency and Ease

Two lines, one from the clutch lever, and one from the speed and reverse lever, were used to control the tractor. These were attached to the plow with the aid of two old binder levers, which serve as controls. With this method excellent results are obtained. I often work the tractor for two or three hours at a time without the necessity of stopping for anything.—Charles N. Garber, North Manchester, Ind.

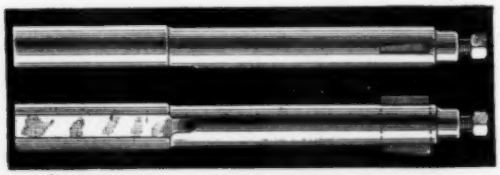
An Improvised Electric-Light Socket

Needing an extra electric-light socket and having none available, I contrived one from a piece of spring wire as indicated in the sketch. Two stove bolts were set in a block of wood. These protruded into a groove on the underside of the block and were used for the wire connections. The spring was wound to fit the threads of the outside electrode of the globe and contact was made with the central electrode by turning the globe down against the bolt in the center of the coil. The makeshift gave thoroughly satisfactory service.—George Perkins, Millburn, New Jersey.



Tool for Conserving Small Pieces of High-Speed Steel

With the present scarcity of high-speed steel, the necessity for conserving



This Tool, Which may be Used for a Variety of Boring Jobs, Has Cutting Members Made from Small Scraps of High-Speed Steel That Usually are Wasted

this material has been brought home to both large shops and small. The tool illustrated permits a wide range of boring operations, utilizing the small scraps of high-speed steel that ordinarily go to waste. The shaft is of milled steel, hence is inexpensive and easy to make. The cutters, being held by a setscrew in the end of the tool, are readily removable for grinding.—L. M. Rowley, Livermore, Calif.

A Holdfast Leather-Belting Cement

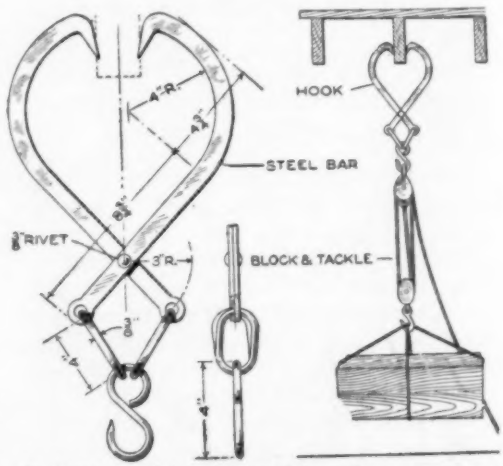
Scraps of waste celluloid, such as old film, combs, and similar articles, dissolved by agitation in methyl acetone to produce a thick sirupy solution, make an excellent leather-belting cement. Belting thus cemented is both flexible and waterproof. It should be borne in mind that the ingredients of this cement are highly inflammable and should not be mixed or used in the vicinity of any open flame.—Leon A. Haloin, Denver, Colo.

Emergency Bearing for Tractor Made from Oil-Soaked Maple

While being operated in a section of country remote from any repair shop, or source of machine supplies, a tractor engine burned out a main-shaft bearing. Without some sort of an emergency repair the machine could not be driven, and to have fitted a new bearing without having the machine in a repair shop would have been practically impossible. As an experiment a bearing was made from a piece of hard maple. It was boiled in cylinder oil for several hours to impregnate the wood thoroughly and was then placed in the machine. With the wooden bearing the machine was run slowly and with an abundance of oil until it became apparent that the wood was developing no signs of heating. The tractor was put to work with this makeshift repair and gave satisfactory service until it could be taken to a shop for a more permanent job.—C. C. Cook, McMinnville, Tenn.

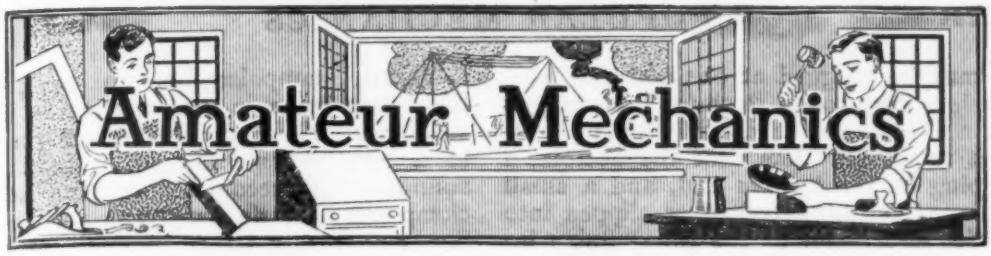
Hoisting Hook Has Instantaneous Positive Grip

An exceptionally handy hoisting hook for use in basements, warehouses, and other places where there are overhead rafters, is made as indicated in the sketch. Such a hook may be instantly attached for use wherever needed. Up to the limits of its capacity and that of the supporting beam, the prongs take a more positive grip the greater the strain imposed upon it. The dimensions given in the sketch are designed for comparatively light



In Shops, or Other Places Where There Are Overhead Beams or Rafters, This Portable Hoisting Hook may be Instantly Applied

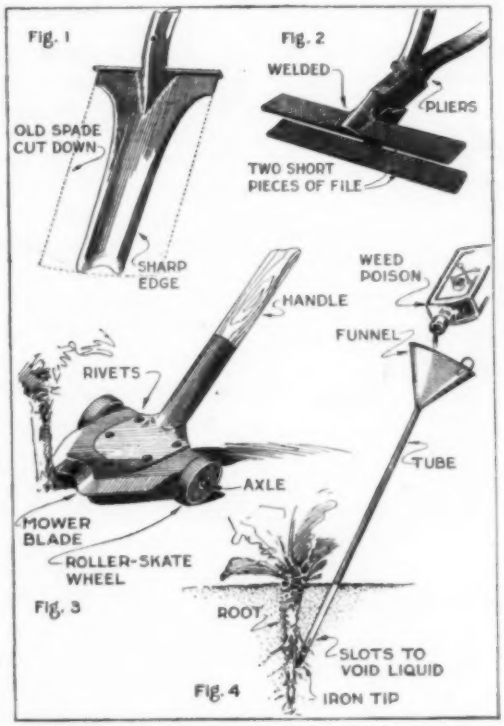
work. For heavier lifting, they should be increased according to requirements.



Homemade Tools for Killing Weeds

By THALEON BLAKE

LARGE weeds are difficult to cut, and, as their removal with a spade leaves an unsightly hole, special tools, that do effective removal without serious disturbance of the ground, are desirable. A tool that may be made from a common garden spade is valuable for cutting out large burdock. The sides of the steel are removed, leaving a blade 2 or 3 in. wide. A concave edge is given the bottom, and the sides are sharpened, as in Fig. 1. This tool is easily pushed with the foot through the toughest roots.



With These Implements One is Armed for Effective Warfare against Every Variety of Weeds from the Stubborn Prickly Kind Down to and Including the Big Burdock with Roots a Yard Long

For smaller weeds, but which have roots hard to pull out, a superior weed-pulling tool may be made from a pair of pliers and two sections of a coarse file. The pieces of file should be welded to the pliers, as in Fig. 2. The jaws should be about 4 in. wide. The virtues of this tool are quickly appreciated if one has to weed out young thistles, nettles, or small thorny bushes.

A more elaborate tool, as in Fig. 3, may be made from a section of a mowing-machine blade, two roller-skate wheels, a rod for an axle, three bolts, four rivets, a wooden handle, and the upper end of an old spade. The mower blade is bolted to the upper part of the spade.

The axle for the wheels is a rod, either welded to the mower blade or attached with two strips of flat iron drilled with holes for riveting. The wheels are kept in place with cotter pins. The nose of the cutting edge may be made concave. This tool was designed originally for cutting stalky weeds that grew among the bricks of a driveway, which was not used enough to keep them from growing, and which was only occasionally visited by the owner. It proved so useful that it earned an honored place in the tool house.

Hardy weeds will grow tops after many trimmings, and where it is not desirable to dig up a lawn, or because the ground near by is planted with garden truck or flowers, the chemical elimination is more commendable than the mechanical. A ½-in. iron pipe

may be plugged at one end and have slots cut around it above the plug, as in Fig 4. By this very simple plan—a tube with slots near the bottom, a plug in the bottom end, and a small funnel either attached or slipped into the upper end of the tube—fluids intended to kill roots may be applied below the surface of the ground directly where they will do the most destruction.

Some gardeners use deadly poisons to kill roots, and some prefer simpler solutions, nonpoisonous to animal life. Salt brine is very cheap; so is soapsuds. These do their destroying in a leisurely manner. Commercial ammonia is recommended for its cheapness and destructiveness. The liquor of freshly slaked lime is caustic and after killing becomes a soil sweetener. Weedless gardens stay weedless only by constant effort; for it seems that the weed that thrived beside the kitchen door, bequeathed its space to half a dozen more.

A Shoulder Carrier for Handling Wounded Soldiers

The carrier illustrated has been suggested for use in narrow trenches, or

Having the Weight Suspended from the Shoulders Makes the Carrying of an Injured Soldier Easier Than if the Load were Supported by the Arms

other places where the nature of the surroundings makes it necessary for a wounded soldier to be carried by one man. A working model of the device indicates that it has numerous advantages. It consists of but three principal parts, the seat or platform upon which the weight of the injured man is carried, and two hooks which support the load from the shoulders. For convenience in packing, the hooks are removable from the bed of the carrier. —A. L. Fuqua, Los Gatos, Calif.

Safety Pin as a Substitute for a Latch Spring

An excellent emergency repair for a broken latch spring may be made by cutting off the point and catch of an ordinary safety pin. The loop portion of the pin is a convenient fastening through which to place the latch screw. One end of the improvised spring will then rest against the wall of the latch while the other end will serve to push out the bolt.—Charles W. Tyler, Indianapolis, Ind.

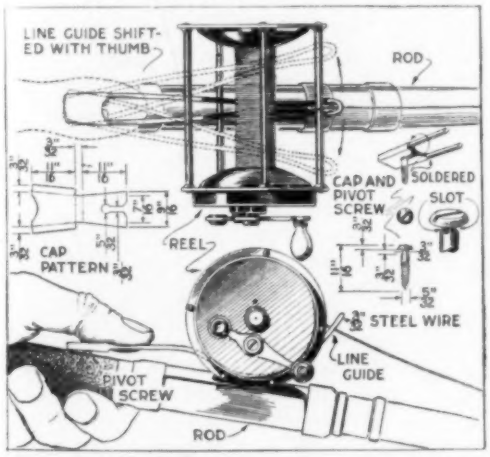
Electrically Punctured Cigarette Papers Afford Amusement

A harmless mechanical joke may be perpetrated upon cigarette smokers who "roll their own," by providing them with papers that have been exposed to a high-tension electric current jumping between two points. This may be done with an automobile, motorcycle, or any other form of gas engine. A terminal wire is removed from a plug and held about a quarter of an inch away with the papers between. The engine is then turned over by hand or by operating with the other cylinders. This causes the ignition sparks to jump through the papers, peppering them full of minute holes. The holes are too small to be seen with the naked eye, but a cigarette made from them will not draw. The victim of this innocent joke usually affords much hearty laughter before he discovers why his cigarette will not burn.

Cigars may be treated in the same manner, it being only necessary to puncture the wrapper.

Homemade Line Guide for Fishing Reel

Letting the big fish get away because of a jammed line is largely eliminated by the use of a homemade line guide for the fishing reel, as shown. Such a guide is easily made by looping a 10-in. piece of $\frac{3}{32}$-in. wire so as to leave an open slot in the middle. On the open end, a light metal cap, $\frac{9}{16}$ in. wide at the front and $\frac{7}{16}$ in. at the rear, as detailed, is soldered. A $\frac{5}{32}$-in. hole is drilled in the center of the cap on the underside. A slot, $\frac{3}{32}$ in. wide, is then cut from the hole, as indicated. A round-headed $\frac{5}{32}$-in. screw, $\frac{5}{8}$ in. long, filed down on both sides under the head until it is but $\frac{3}{32}$ in. thick, at this point, is used as a seat for the guide. The guide is set to work over the lower crossbars of the reel, as shown. With the reel and guide in place, the position of the hole in the cap should be marked on the rod, and the screw inserted at that point. Care should be used to turn the

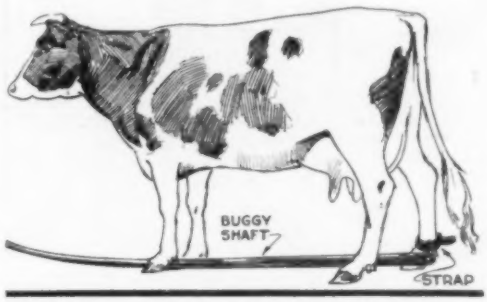


With the Line Guide Little Effort is Required to Secure a Smoothly Reeled Line Even during the Excitement of Hauling in the Prize Fish of the Season

filed seat, under the head of the screw, crosswise with the rod.—Charles Carroll, Baltimore, Md.

Buggy-Shaft Hobble Keeps Milch Cow from Kicking

Cutting off an old buggy shaft and fastening it to the cow's right leg as



With the Buggy-Shaft Hobble Bossy's Kicks Expend Themselves against the Headboard of the Stall

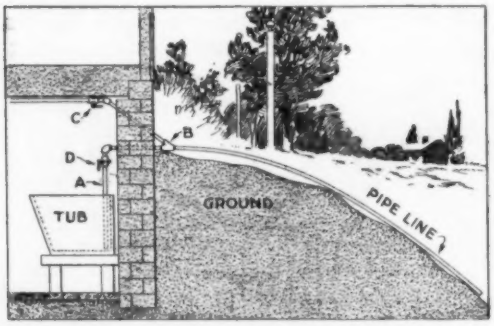
illustrated, a farmer has succeeded in taming a frisky young bossy that formerly made a habit of kicking over the milk bucket. The shaft, as indicated, passes between the animal's legs with the front end in contact with the headboards of the manger. Any attempt to kick during the milking is thus rendered useless. The cow soon learns this and refrains from kicking.—H. V. Stanley, Chicago, Ill.

Siphon Arrangement for Emptying Non-Drain Tubs

A set of washtubs was built in a cellar not provided with a drainage system, and it was thus necessary to carry the wash water out in buckets to dispose of it. The owner soon installed a siphon arrangement, as shown in the sketch, which quickly and easily empties the tubs to within a small quantity of water in the bottom. A pipe, A, with a shut-off, D, was carried up near the wall side of the tubs to the level of the ground outside. There it was connected by an ell at right angles, and a short nipple passed through the wall to a Y-joint, B. The remainder of the line was then led along the ground until the end reached a level below the bottom of the tubs. The water supply was connected to B with a shut-off, C.

When the tubs are full and need

emptying, the shut-off D is closed and C opened. When water is flowing from the pipe line, C is closed, and D opened

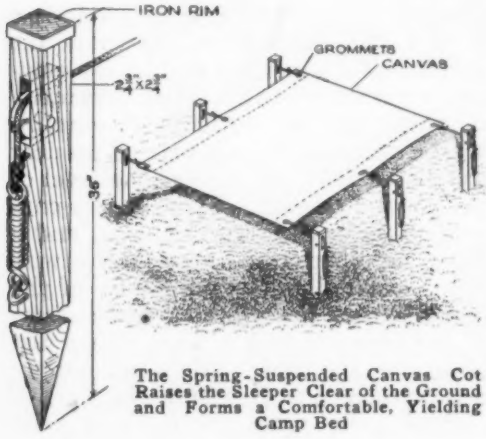


The Tubs are Drained by Means of the Siphon Arrangement, Thus Avoiding the Laborious Carrying of Water to Empty the Tubs

simultaneously. The water flowing out of the pipe line causes the water in the tub to rise and flow out until equilibrium is again established, which occurs when the tubs are practically drained.—L. B. Robbins, Harwich, Massachusetts.

Camp Cot Fitted with Coil Springs Provides Homelike Comfort

One of the most serious objections to camp life are the miserable nights that are ordinarily spent before one becomes accustomed to sleeping on the ground, or on a bed of boughs, after having been used to comfortable springs and mattresses at home. A cot

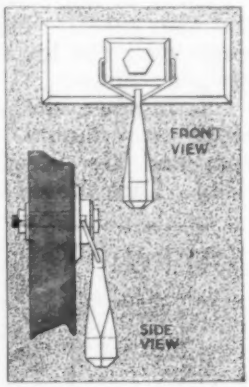


The Spring-Suspended Canvas Cot Raises the Sleeper Clear of the Ground and Forms a Comfortable, Yielding Camp Bed

which will add greatly to the pleasures of camping, may be made by suspending a length of canvas in connection with coil springs, as illustrated. Six posts, 2¾ by 2¾ in., and 36 in. long, are cut and pointed at one end. The other ends are recessed to receive 1¼-in. wood pulleys. Ropes are tied into the grommets in the canvas and passed over the pulleys to the coil springs, as in the sketch. Heavy hooks are screwed into the posts to serve as holders for the springs. The finished cot will enable one to sleep in comfort, while it may also be rolled into a small bundle for carrying.

Artistic Handles for Table Drawer Made from Scrap Materials

Finding the artistic handles that I desired for use on a library table beyond the reach of my pocketbook, I made a pair, as illustrated, from waste material picked up about my home shop. From a piece of sheet brass, ⅛ in. thick, I sawed two plates, 3 by 1¼ in., and put a ⅛-in. bevel on all four sides of each. Through the exact center of each I drilled a ¼-in. hole.

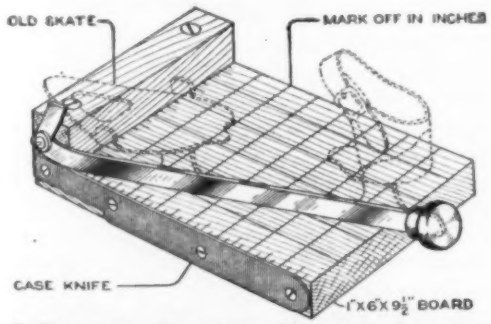


Then from a piece of brass, ¼ in. thick, I sawed two pieces, 1⅛ in. long and ¾ in. wide, and beveled their four sides. Through the center of these, ¼-in. holes were drilled. On the back face of each piece I filed a slot big enough to take the end of a piece of No. 14 gauge wire. Two old brass cap screws formed the central portion by which the handles were to be fastened to the drawer. A piece of ½-in. hexagonal brass rod was cut into two pieces, 2½ in. long, then ground and filed to the shape shown. A hole big enough to slip over the wire holder was drilled in the small end. I then bent a piece

of No. 14 gauge brass wire into the shape illustrated. The brass was given a dull finish by rubbing it with a piece of old sandpaper. It was then coated with lacquer to keep it that way. The completed handles cost little beyond the labor expended, but they added much to the artistic appearance and value of the table.—John Wallace Shaw, Palmer, N. Y.

Photograph-Trimming Board Made from an Old Skate

A thoroughly satisfactory trimming board for amateur photographers' use may be constructed by mounting the runner of an old ice skate on the side of a board, as shown in the sketch. The blade of a discarded case knife is mounted as illustrated, to form the cutting edge of the board. Before the metal parts are fitted, the board, which should be of some clear hard wood, should be planed and sandpapered smooth. The measurements are then plotted off, and the position of the end block determined by the use of a carpenter's L-square. Both the skate and the case knife should be thoroughly sharpened before being mounted. Most persons prefer to use their right hand for holding the photograph, and to operate the cutting knife with the left hand. This, however, may be arranged to suit one's fancy by mounting

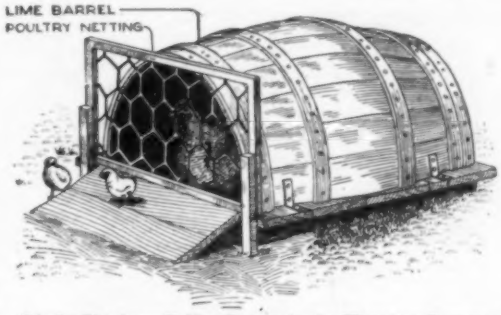


A Thoroughly Serviceable Photograph-Trimming Board may be Made in the Home Workshop by Mounting the Runner of an Old Skate and a Discarded Case Knife on a Block of Wood

the cutting surfaces on either side of the board.—Dale R. Van Horn, North Loup, Neb.

Economical Chicken Coop Made from a Lime Barrel

An excellent chicken coop, and one which especially recommends itself as a shelter for little chicks during sum-



Little Chicks will Not Drown in the Heaviest Summer Thunderstorm if Provided with a Half Barrel House for Protection

mer showers, is made by halving an old lime barrel and mounting it as illustrated. Such a coop need represent no outlay other than the necessary labor of constructing it. Any kind of a barrel might be used, but a lime barrel is best for the reason that the boards, being impregnated with lime, offer a degree of protection against vermin.

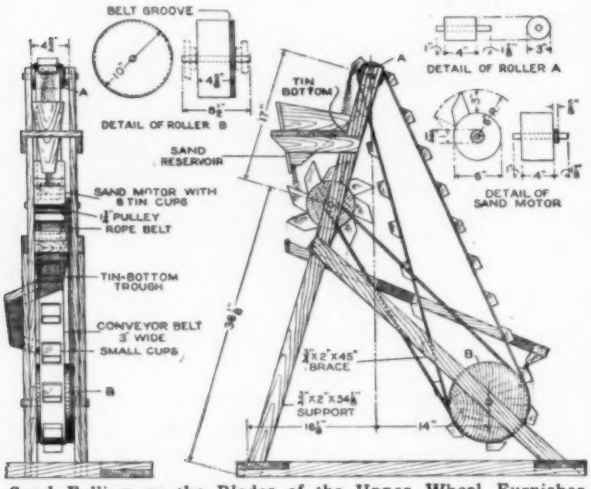
A Medicine Dropper Made from the Bottle Cork

An efficient medicine dropper may be obtained by cutting a shallow notch in the side and near the base of the cork used to stop the bottle. By tilting the bottle to throw the contents into the neck the notch is filled with the fluid. Capillary attraction will cause the liquid to remain in the notch while the cork is removed. The drop is then removed by shaking the cork slightly or touching it against the object upon which it is to be deposited.

Automatic-Elevator Toy and Sand Motor

The sand hoist and elevator toy illustrated, while being largely automatic in its action, is not, of course, a perpetual-motion machine, inasmuch as it will not hoist the sand as fast

as it is consumed to produce power for operation. The reservoir at the top compensates for this loss in some degree, and if made fairly large, will supply power to keep the machine in motion for an hour or more. To ren-



Sand Falling on the Blades of the Upper Wheel Furnishes the Motive Power to Operate a Conveyor Belt Which Hoists a Part of It to be Used Over Again

der the construction as simple as possible, all details of dimension are given in the drawing. The wheels A and B are cross sections that may be sawed from any round stock of suitable size, and the axles upon which they are mounted are nothing more than large dowels fitted loosely into well-greased holes in the frame. The power wheel is made by changing the shape of eight large cocoa cans, cutting out one side, and tacking them to the wooden drum. Small spice cans are used to form the buckets of the conveyor belt. These are riveted to the belt near the middle of their lower half to enable them to roll over the drums readily. Several quarts of fine dry sand are used to operate the motor. The toy will not have much more than sufficient power to keep itself in motion. It nevertheless affords great amusement and at no expense whatever.

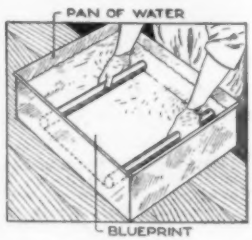
¶To keep pewter bright, wash it with hot water, rub with sand soap or soap powder containing fine silica, and when dry, polish with leather.

Handy Tool for Keeping Rifle Mechanism Clean

One of the first lessons of the new recruit is that his rifle is his best friend and that it is his duty to take as good care of it as he does of himself. Rifles used in practice at the cantonments, or on the battle front, are subject to all conditions of weather as well as dust, dirt, mud, and accumulations of burned powder. The bolt and breech mechanism becomes clogged, and the arm is soon unfit for service unless it is cleaned properly as often as becomes necessary. For removing such foreign matter from the mechanism, a very handy pocket tool is made from a 2-in. length of boxwood, or other soft wood, about ½ in. wide and ¼ in. thick. One end is tapered to a point, while the other end is flattened to a broad sharp edge. With these points one is able to get into the rifle parts where dust and other accumulations have gathered. Grease, dirt, and even the residue from burned powder, may be quickly dislodged from grooves and corners without danger of cutting or scratching the arm.

Roller Device for Washing Long Blueprints

When blueprints are 60 in. or more in length, there is great difficulty in washing them. Sometimes they get torn or wrinkled, making the prints appear untidy. An easy method of avoiding this is shown in the illustration. Cut from an old flagpole or broom stick two rollers smaller than the width of the basin. Wind the print on one roller, then start winding the free end on the other roller under



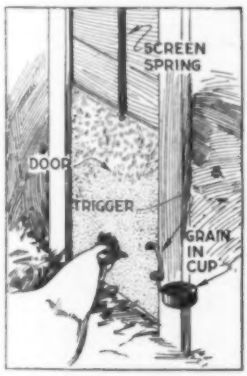
the water. After the print has changed rollers, repeat the operation until the print is washed.

White Paint on Steps Reduces Danger of Cellar Stairs

White paint applied at the bottom and next to the top step of the cellar stairway will prevent many a fall caused by darkness. Even in the faintest light the white markings are visible, making the points at which falls ordinarily occur much less dangerous.—C. C. Spreen, Flint, Mich.

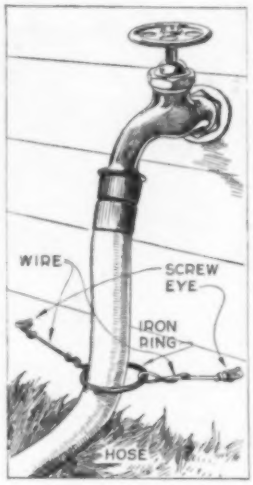
Automatic Poultry-House Door Excludes Freebooters

If the poultry house is shut up at night so cats, and similar freebooters, are excluded, it follows that some one usually has to get up at sunrise to liberate the fowls. This was a problem that annoyed me for some time, but which I succeeded in solving by the method illustrated. The door is mounted in slides and is held open by a coil spring. When the door is pressed shut the spring is brought under tension, where it is held in that position by a latch, at one end of which is mounted a small cup. In the evening after the birds have gone to roost I close the door, latch it, and put a few grains of corn in the cup. At sunrise the first hen off the roost finds the corn, pecks the cup to get it, and releases the latch. The spring pulls the door open. The device was so satisfactory in the hen house that I have since adopted a smaller one for use in my brooder house. It works equally well for the small chicks.—R. V. Weller, Irondequoit, N. Y.



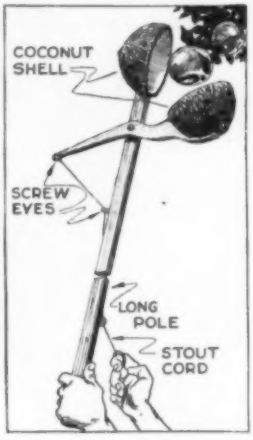
Simple Anchorage Prolongs Life of Garden Hose

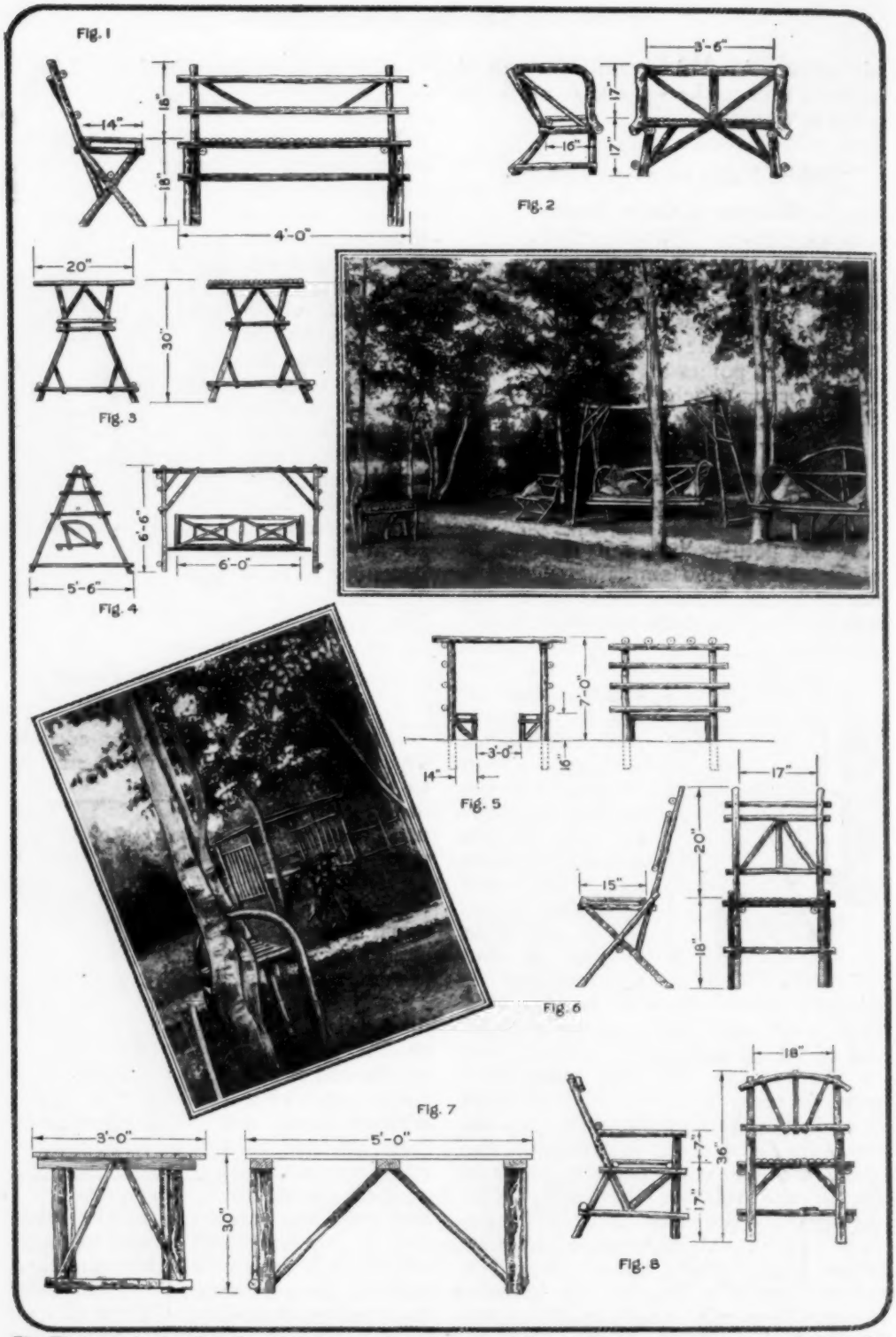
Hoses are frequently made leaky or even broken by being kinked near the faucet connection when dragged about over the lawn. Such damage may be eliminated by the use of a simple ring fastening, as shown in the sketch. The wires should be of sufficient length to permit the hose swinging out to an angle where it cannot kink.—T. J. Butler, Mobile, Ala.



A Coconut-Shell Fruit Picker with Long-Reach Handle

If care is used in opening a coconut by sawing the shell before attempting to split it, the halves may be used to form the principal parts of a thoroughly serviceable high-reach fruit picker. The shells are mounted as shown in the illustration. One half is mounted on the end of the pole and the other is on a lever, pivoted as indicated. A stout cord is fastened to a screw eye in the lower end of the lever and passed through other screw eyes down the handle. A pull on the cord causes the halves of the shell to close on the piece of fruit to be picked.—John J. Spaulding, Zanesville, Ohio.





The Photographs Are But Suggestions of a Great Variety of Rustic Designs That might be Carried Out for Use in the Summer Home, for Lawn Furniture, and Similar Purposes. The Sketches Show the Methods of Construction Described in the Text

Homemade Rustic Furniture and Garden Features

by A.W.MacMillen

PLEASING rustic furniture may be made from saplings with only a hammer, saw, and an assortment of nails. Cedar saplings, as they are found growing in the more dense timber, are excellent material for homemade portable rustics. Cedar is preferable because of its lightness, strength, and the ease with which it may be worked.

Most of the furniture and pergolas illustrated were made from saplings, ranging from 1 in. to 3 in. in diameter. The majority of the material used ranged from 1¼ in. to 2 in. through, very straight and gradually tapering toward the whip end. A dozen or more of the trees had graceful right-angled curves at the base, where, as seedlings, they had grown out horizontally from the mother clump before turning toward the sky. These curves answer admirably for arms.

A simple and easily made settee is shown in Fig. 1. This is a very light and rigid construction. One-inch and 1¼-in. pieces may be used with good effect here. The crosspieces which serve for the legs must be fairly accurate duplicates. This requirement is met by forming one entire end, and using it as a pattern for the other.

The slanting tie pieces, at the top of the back rest, hold the seat from collapsing sidewise. Sawed lumber may be used for the seat portion, but an artistic resting place may be constructed by using small-diameter pieces, all cut to the same length and then slanted off at each end where they are to rest on the front and back support. It is well to mark the position of all cuts while the piece is held in its final position.

A varied assortment of nails should be available. Thin brads are used for the corrugated seat portion. To avoid splitting, it is well to use brads where a slant cut meets a straight portion. The appearance of the finished article depends largely upon the relative size of pieces used in its construction.

The heavy settee, shown in Fig. 2 and at the left in the photograph of the table and seats, is a very rigid construction. It has curved arms, but straight arms are almost as pleasing if curved materials are not available. By shortening the length, chairs may be constructed along the same lines as either of the settees shown.

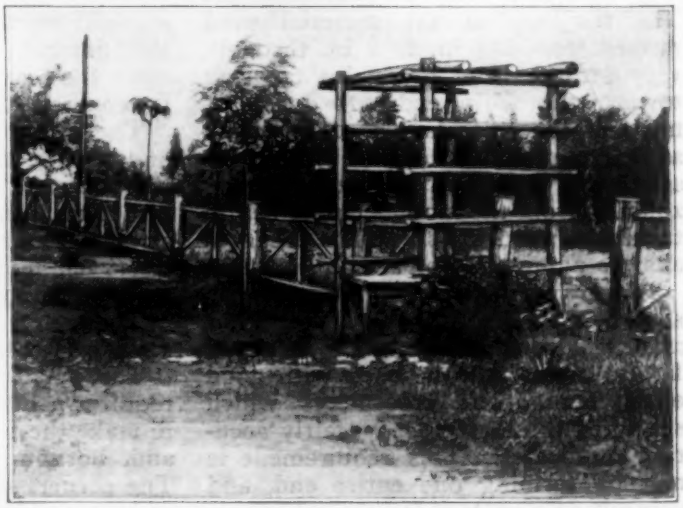
The small table, shown in Fig. 3, requires a little more care. It is well to make the frame first, nailing the top and bottom portions on afterward. The corner, slanting tie members may be left until last. No trouble should be experienced if all similar pieces are cut the same length and a little help is obtained to get the sections in the correct position while being nailed.

The swinging seat, shown in Fig. 4, will require fairly heavy material. If constructed to hold six persons, a 3-in. piece should be selected for the top pole. The side supports are so braced that 2-in. members will be sufficient. The base of these side supports is offset slightly from the center of the construction, to prevent side sway. This offset should not be over 3 in., as more than that will weaken the construction. The end tie members are all in tension and may be of small diameter. The slanting tie members, however, may be in either tension or compression and should be larger. All of these tie members should project beyond the piece to which they are nailed. This prevents a split while the frame is being constructed, or later when the structure is under load. It is well to use as large nails here as the members will stand. A frame of cedar made on this pattern has held half a ton without noticeable weakness.

For the swing itself fairly heavy pieces should be used, especially for the two long supports which are held by the chain. Each of these members may be reinforced with good effect by nailing two pieces together, one above the other. The rear one should be placed well in back of the seat, to prevent tipping over backward. In all of these seats, slants and dimensions may be taken from comfortable chairs in the home with good effect. The height and slant of the back is an important item, and it is well to have some one hold this member in place while a practical test is made of the most comfortable position. It may be found that a more comfortable resting place is formed if the seat itself tips back slightly. The dimensions given are merely suggestive.

The general method lends itself admirably to the table shown in Fig. 7, and the chairs of Figs. 6 and 8. Light pergolas, as constructed in Fig. 5, vine-covered retreats, whimsical bird homes

Tables, Chairs, and Fences Are All Among the Rustic-Furniture Possibilities



Vine-Covered Pergolas and Fences of Rustic Construction Add Much to the Attractiveness of the Lawn. For Park Furnishings It Is Doubtful if Any More Artistic Effects can be Produced

made in imitation of log houses, small bridges, and even fences, where ornament rather than utility is desired, are all among the easy possibilities. The photographs illustrate some of these.

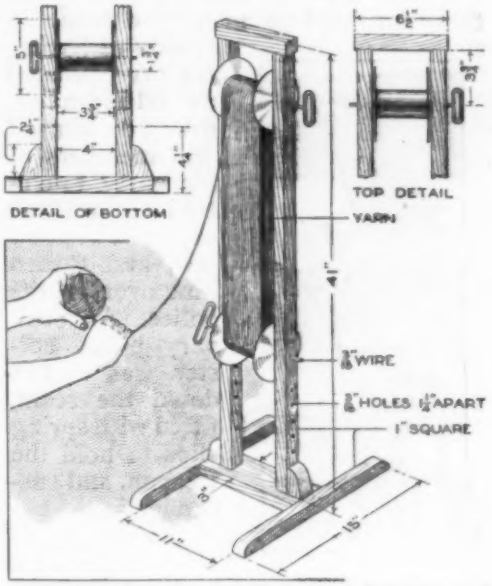
It is impossible to nail through the large fence posts into the horizontal poles, so the same rigid construction cannot be followed here. The connecting sections of the fence shown in the photograph are merely toenailed into the posts. This fence, however, has lasted three seasons and is probably good for many more. A more substantial fence may be made by boring holes in the post, and using a hollow auger for forming a dowel portion on the poles. But this is a tedious process and requires a carpenter's skill. The remainder of the constructions are so designed that sufficient rigidity is obtained with nails, and anyone who is at all handy with tools can make them. The results are substantial, practical, and artistic.

Eliminating the Sag in a Pulley Line

By binding two wooden curtain rings with wire and using them as a holder, through which to draw the lines of a pulley clothesline as the weight of the garments comes near the center of the supports, much of the sagging strain may be eliminated. The possibility of the clothes dragging on the ground is thus overcome, and they may also be held in a higher current of air where they will dry more rapidly.—Dr. C. A. Rhoades, Boone, Ia.

Easily Constructed Rack for Holding Yarn

An easily constructed winding rack to hold yarn in skeins consists of a wooden frame, 41 in. high, having two uprights between which are set two removable spools that turn on pins made of 3/16-in. wire. The spools are of wood, and are provided with broad flanges of tin, making the spool ends 5 in. in diameter. The lower half of the uprights are pierced with 3/16-in. holes every 1¼ in., to permit the placing of the lower spool the proper distance from the upper one. A base, 15 in. long and 11 in. wide, gives the rack stability so that yarn can be wound from the spools without difficulty.



An Adjustable Rack on Which a Skein of Yarn may be Placed Preparatory to Winding It into a Ball

A Stump and an Ax Used as a Wood Lock

When sawing cord wood into stove lengths on the ground where the timber is felled, sawbucks are seldom available. Under such circumstances a serviceable wood lock may be improvised by sticking the blade of an ax in a stump as illustrated. If used in conjunction with the torn splinter of wood that usually projects upward at the edge of a stump, the wood may be securely locked on both sides.—Raymond D. Harris, Opportunity, Wash.

Novel Revolver Holster for Autos Foils Hold-Up Men

During a period of extraordinary activity of hold-up men, a citizen, by reason of having his car equipped as illustrated, saved himself and members of his party from being robbed, captured the outlaw, and turned him over to the police. An ordinary pistol holster was split down the seam, fitted with spring clips to hold the weapon, and suspended in the top of the vehicle, as shown. When the owner of the machine received the order "hands up," his right hand came in contact with the butt of the revolver. The highwayman's attention was then distracted for a moment by a fellow passenger in the car, and when he turned to his intended victim again he found himself looking down the muzzle of the motorist's gun. He was compelled to drop his own weapon, and was held at bay until the police arrived. — Paul J. C. Derkum, Los Angeles, Calif.

Climbing Poles or Trees with Wire Loops for Climbers

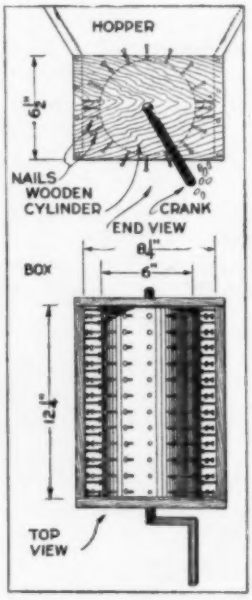
Poles having no foot cleats may be climbed without linemen's climbers by the use of wire loops surrounding the pole and attached to the climber's feet. A heavy wire should be used. The loop around the pole should be slightly larger than the diameter. A smaller loop is provided for the foot. Clasping the pole with the arms and raising the foot in the small loop, the loop on the pole will slide upward. When the weight of the body is put into the small loop the larger loop will effectively bind the pole, holding the climber in safety until a higher grasp may be taken. The descent is made in reverse order.—Peter J. M. Clute, Schenectady, N. Y.

Mending a Loose Umbrella Handle

If the handle of an umbrella becomes loose it is a source of constant annoyance. A simple remedy for this difficulty is to fill the hole in the handle with powdered sulphur. The end of the rod is then heated and pushed down into the sulphur. This will fuse the sulphur and cement the rod firmly in place. An umbrella thus repaired will be more secure than it was originally.

A Small Rotary Bean Huller for Home Gardeners

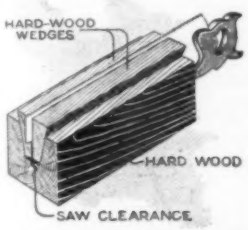
Hulling dry beans by hand is an almost impossible task, if there is any quantity to be hulled. The rotary device illustrated may be contrived by anyone, and it will hull more beans in an hour than 10 persons could in a day by hand. It consists of a wooden cylinder, 12 in. in length and 6 in. in diameter, mounted in a frame, 12¼ by 8¼ in., inside measurements. The cylinder is studded with 16 rows of nails, spaced 1 in. apart. Two rows of nails are driven in the inside of the frame, staggered in relation to those of the cylinder. All nails project 1 in. On the



top of the frame is mounted a hopper, constructed to direct the flow of pods against the hulling teeth as the cylinder is revolved. A crank is provided for the purpose. The whole is provided with legs, and a box is placed beneath to catch the threshed product. A trip through the fan mill quickly separates the beans from the broken-up pods.—Edwin R. Mason, Danville, Illinois.

Improvised Vise for Holding Saws While Sharpening

Saw clamps are expensive and not ordinarily a part of the amateur mechanic's tool equipment, yet saws become dull, and sharpening and setting them is well-nigh impossible without some means of holding the blade securely. A thoroughly serviceable clamp may be made by notching a block of hard wood as in the sketch. The size of the block will depend upon the size of saw to be sharpened. Two lateral cuts are made in the block to a depth that will permit the large V-shaped section to be chiseled out. The V-shaped wedge is then replaced and sawed in two lengthwise. The saw may then be clamped securely by placing it between the wedges and driving them into the block.—William Roberts, Ayer, Mass.

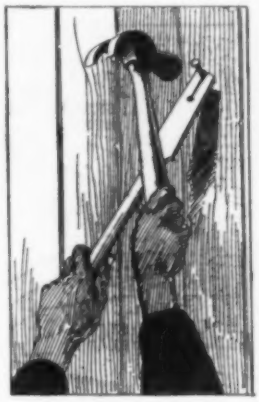


Tree Sprayer Used for Spraying Barn and Fence Paint

Tree sprayers of the type used for exterminating parasites may be employed with equal success for applying varieties of thin paint such as used for barns, fences, and outbuildings. If thoroughly cleaned afterward the sprayer is none the worse for having been so used.—Fred Otheman, St. Louis, Mo.

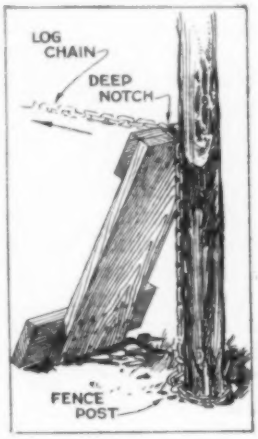
Nail Holders Prevent Injury to Fingers

Nails may be started beyond one's reach, and injured fingers are avoided, by the use of the simple nail holder shown in the sketch. The end of the stick is slotted to a depth of about 2 in. and a ¼-in. hole is bored at the end of the slot. The various sizes of nails are held firmly and may be driven as far as the hammer will reach.



Fence-Post Puller for Use on the Farm

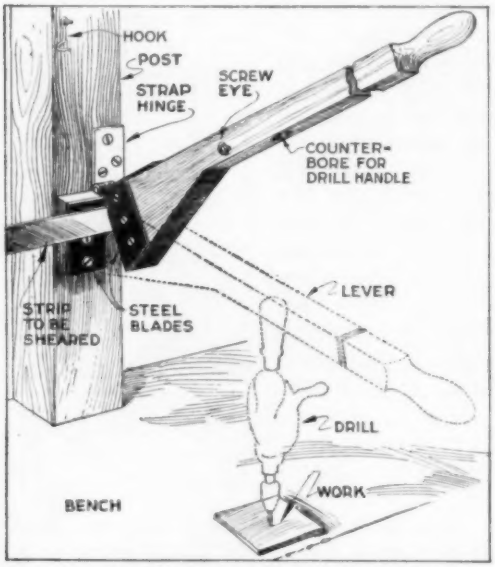
An easily contrived fence-post puller, which will be found equally satisfactory for light grubbing operations, is made as shown in the sketch. A heavy plank is cleated at both ends to prevent splitting. The lower cleat should project beyond the edges of the plank to provide the necessary surface against the ground. The plank is notched at the top, as illustrated. A heavy chain is fastened at the base of the post to be pulled and passed over the notch, after the plank is placed at the angle indicated. A pull on the chain either by horses or a tractor lifts the post out of the ground.



¶A magnet will be found handy when washing steel balls in gasoline.

Cutting and Drilling Sheet Metal in the Home Workshop

The cutting and drilling of brass or other sheet metal may be speeded up in the home workshop by the construc-



Sheet Metal is Trimmed and Drilled with a Minimum Loss of Time and Energy by the Aid of Cutting Shears and Pressure Lever Which may be Readily Constructed by Any Amateur Mechanic

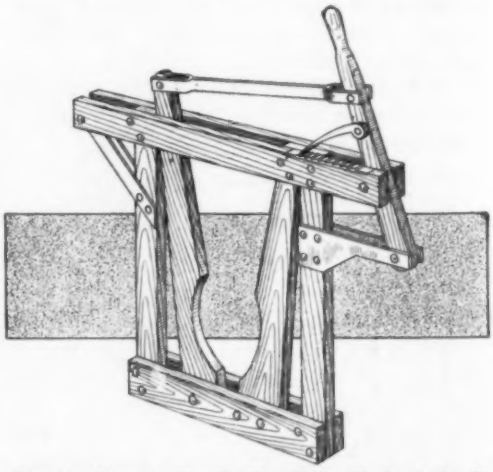
tion of a shearing tool and hand drill press, as shown in the sketch. A substantial lever of some clear, hard wood is fastened with a heavy hinge to an upright at the back of the workbench. The cutting members are two steel blades, which are cut to shape, drilled, hardened, and attached, as illustrated. A counterbore socket on the underside, near the middle of the lever, takes the handle of a small breast drill, and is used to furnish the necessary pressure for drilling by bearing down on the end of the lever. A screen-door hook and screw eye are provided for fastening the lever back out of the way.—G. A. Luers, Washington, D. C.

Paint Made without Lead or Oil

With white lead and linseed oil at almost prohibitive prices, a durable paint which does not require these ingredients is desirable for many uses. Such a paint may be made by combining the following: 2 lb. of whiting, 1 qt. of skimmed milk, and 1 oz. of fresh-slaked lime. A glass, or earthen, vessel, should be used to mix the materials. The lime should be put in first, after which sufficient milk is poured in to make a thick paste. The balance of the milk may then be poured in and the whiting mixed in gradually. The whole should be stirred until mixed thoroughly. If a colored paint is desired, ocher may be aded to produce various shades of yellow; carmine for red; indigo for blue, and other coloring materials, obtainable at any paint store, may be added. The paint will dry quickly and will wear well. It is economical and thoroughly satisfactory for use on fences, outbuildings, and similar places where high-grade paint is not essential.—C. Illingworth, Mission City, B. C.

Stanchion for Holding Hogs While Ringing

The hog stanchion illustrated is strong enough to hold the largest boar, yet simple enough to be constructed in the farm workshop with such materials as are usually on hand. The framework is made from 2-in. boards of oak, or other hard wood. The metal fittings were secured from an old dismantled grain binder. In use, the stanchion is

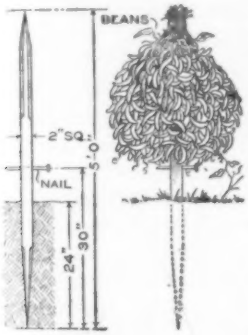


Ringing Hogs is Greatly Simplified If the Animal's Head is Held Immovable. The Stanchion Holds It Securely and Permits an Instantaneous Release When the Operation is Completed

bolted securely to stakes driven into the ground, or to the sides of a barn or other building. For dehorning cattle the dimensions of the structure are increased, and it is given special adaptations according to the requirements.

Simple Rack for Drying Field Beans

Damage from mildew, rust, and rot may be eliminated in the drying of field beans by the use of the simple rack illustrated. A piece of hard wood, of the dimensions indicated, is sharpened at both ends, and 30 in. from the bottom a large spike is driven through it. A crowbar is then driven into the ground to a depth of 24 in., to make a hole for the stake, which is placed by using the nail for a handle. The bean vines are shocked in large bundles and hung over the top of the stake, as shown. In this position they are ventilated thoroughly, the plant parasites ordinarily attacking them cannot work, while rain or heavy dew quickly drains off.—T. J. Hubbard, Mendota, Ill.



Surgeon's Adhesive Tape Used as Substitute for Sewing Wax

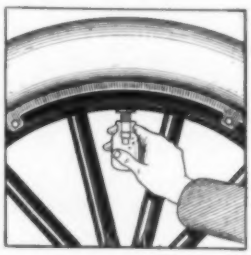
I recently had occasion to thread a loosely twisted silk cord through small eyelets, and the ends of the cord were frayed out so they could not be put through. As there was no beeswax available, I drew the ends through a folded piece of surgeon's adhesive tape. The zinc-oxide paste removed from the tape held the frayed ends securely while they were passed through the eyelets.—A. B. Gardner, Dowagiac, Michigan.

Toy Parachute Used to Hoist Tools in Tall Smokestack

A workman at the top of a tall smokestack discovered that certain tools he needed were not among those he had taken up. To climb down meant the loss of valuable time and an exhausting effort. His needs were shouted down the flue to his helper below, who solved the difficulty as illustrated. A tiny parachute was made from a piece of paper, tied to a spool of thread, and taken to the top of the chimney by the natural draft. The man at the top caught the parachute and with the thread drew up a stronger cord which was used to hoist the necessary tools.—Robert McGrath, Kansas City, Kan.

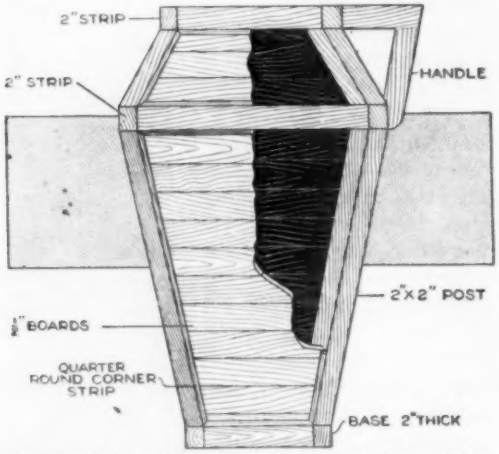
Leaky Tire Valve Tested with Bottle of Water

Leaks at the valve in a tire of a bicycle, automobile, or other vehicle are difficult to locate by ordinary examination of the suspected valve. A simple and certain method is to apply a small bottle of water to the valve, as shown, both with and without the valve caps in place. The cap is often sufficient to hold the air, hence this added test. If the valve leaks, replacing the plunger with a new one is the most effective method of overcoming the trouble.—P. P. Avery, Garfield, N. J.



Artistic Design for Waste Receptacle

A desire for something more pleasing to the eye than the average box or barrel, as a receptacle for waste material, led to the construction of the wooden urn illustrated. It is in effect a Greek vase made square. The construction is simple, consisting of a framework of 2 by 2-in. pieces, into which are fitted panels of ½-in. lumber. Quarter-round strips, with the sharp edge dressed to fit into the angles of the frame and the boards, are used to hide the joints and give the panels a finished appearance. The angle at which the boards of the panels meet the uprights of the frame requires a careful, but by no means difficult, saw cut. Painted or stained some neutral shade of green or brown, such receptacles produce an inconspicuous and by no means unpleasing effect.—C. L. Meller, Fargo, N. D.



For Use Either in the Home or on the Lawn This Receptacle for Waste Paper or Other Refuse Is an Aid to Appearance

Beans Hulled with an Ordinary Clothes Wringer

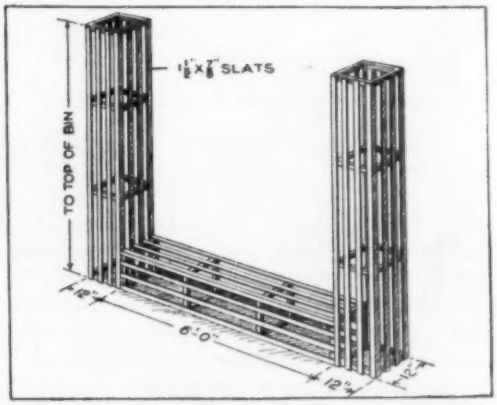
Persons having war gardens in which a small plot of beans is cultivated, will find, upon harvesting their crop, that an easy way to separate the beans from the pods and stems is to run them through a clothes wringer. The thumb nuts governing the spring tension between the rollers should be loosened somewhat, so that the beans will go through without being broken. The pods, however, will be broken and the beans will fall out. If the wringer is mounted on the side of a tub or box a receptacle for catching the thrashed product is provided. Broken pods, stems, and other chaff are easily separated from the beans.—Hubert Stoner, Washington, Pa.

Preventing Chickens from Roosting on Edges of Nests

Dirty eggs will not bring highest market prices, and for obvious sanitary reasons chickens should be discouraged from roosting on the edges of nests. This may be accomplished by providing suitable roosts and then stringing a No. 12 gauge wire along the edge of the front board of the nest rows. The wire is placed 1½ in above the upper edge of the board. The wire, being too small in circumference for the chickens to get a foothold, drives them elsewhere to roost. —J. W. Hendershott, Tupperville, Ont., Canada.

Ventilating Shaft for Vegetable Bin Safeguard against Rot

By providing sufficient ventilation, the chief cause of fruit and vegetable decaying in storage bins, where proper

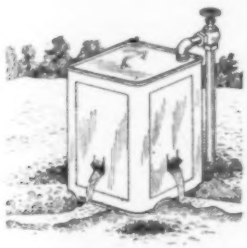


The Slat Shaft is Set in the Bin and the Vegetables are Piled over It. Perfect Ventilation is Thus Secured

temperature is maintained, is removed. This may be accomplished by constructing a U-shaped shaft through which air can circulate freely. For a bin, 10 ft. square, the dimensions of the boxing and material should conform to those indicated in the drawing. Care should be taken that the slats are not spaced too far apart and that those used in the horizontal crate are braced sufficiently to sustain the weight they will have to carry. For heavy products, such as sugar beets, heavier slats may be used.—James E. Noble, Toronto, Ont., Canada.

Five-Gallon Oilcans Used as Irrigation Guides

When irrigating from an ordinary hydrant more or less difficulty is usually experienced in making the water run in two or more different directions. The walls of the trenches quickly wash away, causing the flow to take whichever direction leads downhill. This trouble may be readily eliminated by puncturing the sides of a 5-gal. oil tin and using it under the hydrant, as shown in the sketch. In this way the water may be sent into at least four ditches and may be permitted to run indefinitely without any tendency toward changing its course. —Harry G. Oliver, Los Angeles, Calif.



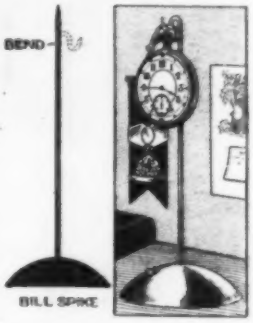
IRRIGATION GUIDE

Pencil Salvage Reduces Drafting-Room Expenses

Drafting rooms should be provided with a box for pencil stubs divided into compartments, each labeled for a particular grade of pencil. When a draftsman requires a piece of lead for his compass, or other drawing instrument, he has but to go to the box, select a pencil, and split the wood from it.—O. J. Byrne, Baltimore, Md.

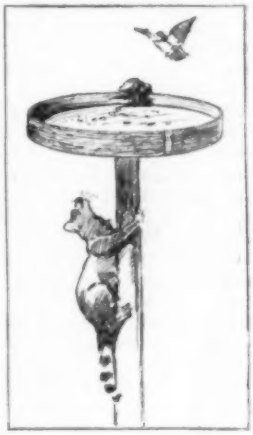
Convenient Watch Holder Made from a Bill Spike

When a watch is used as a desk, or table, timepiece, it is in constant danger of being damaged by other objects handled near it. It is also usually necessary to pick the watch up to determine the time. An excellent holder for a watch so used is made as indicated in the drawing. An ordinary bill spike is hooked at the top, as shown, and the watch hung upon it. In this position the watch is at all times visible and is not liable to be damaged inasmuch as the weight of the bill-spike base makes it hard to overturn. —W. Warnecke, Jr., New York, N. Y.



Cat-Proof Bird Lunch Made from Cheese-Box Lid

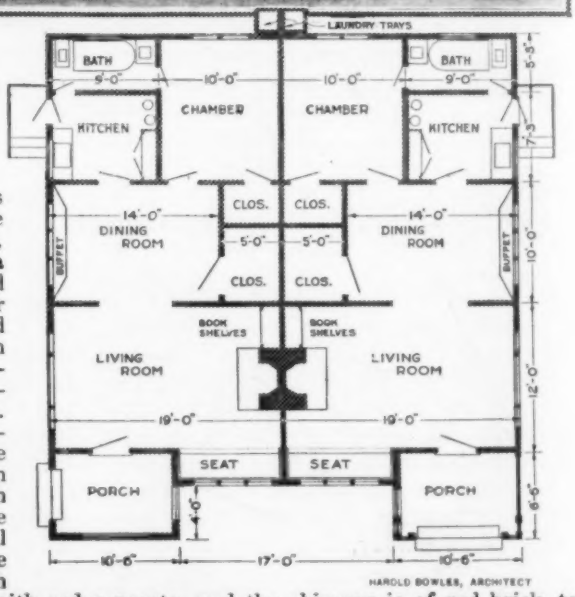
A simple but thoroughly serviceable bird lunch may be made by mounting a cheese-box lid on the top of a pole, as indicated in the sketch. Such a lid is usually to be had for the asking at any grocery store, and when adapted to its new purpose, will add much to the attractiveness of the home by the feathered songsters it will bring. Even the most acrobatic cat will be foiled in his efforts to reach the birds.



¶An electric fan is of material aid in kindling fires under boilers from which the fires have been drawn.

ugust 15 Cents

ARTISTIC DUPLEX RESIDENCE OF LOW COST



MANY conditions are combining to promote the popularity of well-planned duplex residences—houses designed for the occupancy of two families. Increasing numbers of these structures are being erected in moderate-sized towns, and in the outlying sections and suburban districts of cities. From a rather commonplace and none-too-appealing arrangement, the scheme has been developed to a practical, economically sound, and even attractive one. The particular dwelling described herewith is a good example of the present-day trend in such designing. It is artistic in appearance, and, for a four-room combination, quite comfortable in layout. The exterior architecture is an adaptation of the modern English style. The building is of light frame construction and suited for our warm climates, such as are afforded in California and the South. White cement stucco on metal lath composes the outer walls. The shingle roof is stained green to match the trimming. Entrances are paved with red concrete, and the chimney is of red brick to correspond. To the casual passer-by the residence does not advertise the fact that it contains two ground-floor apartments, for the presence of the separate entrances is not conspicuous. As is disclosed by the floor plan, the two apartments are of similar arrangement. The rooms are of comfortable, though not large, size and two closets of generous capacity are provided. Since there is no basement, the attic space is utilized for storage purposes. Floor gas furnaces are provided for heating purposes. These are situated in the living rooms and have cement hearths before them, and bookshelves on one side. Pine is used for the interior trim. A year ago the house was built for $2,750, approximately.

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